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A FAITHFUL FOSTER-MOTHER.
Short-eared Owl Mothering Three Domestic Chicks.

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THE SHORT-EARED OWL AS A FOSTER-MOTHER

BY ALEXANDER DAWES DU BOIS

Plates XIX-XXII

THE phenomena of foster-parentage cast many interesting side lights upon the moral and mental endowments of the lower animals. It is well known that, under certain circumstances, animals sometimes adopt the young of others. Any failure to gratify the compelling, maternal instinct in the natural way constitutes the commonest and most potent of these circumstances. It is usually the female that becomes the foster-parent. She may voluntarily adopt the young of other animals of the same species, or even those of other species and different genera.

Frequently the animal foster-mother undertakes responsibilities of a nature wholly unknown to her through any previous experience. This is true of birds in whose nests man has substituted entirely strange eggs, (or even other objects which resemble eggs) in place of the bird's own.

What would an Owl do if I put hen's eggs in her nest? This question stimulated my natural curiosity to the point of trying the experiment. The Short-eared Owl (*Asio flammeus*) is the only one of our Owls which nests upon the ground, and which, therefore offers a favorable opportunity for such an experiment.

A homesteader's shack, in the prairie region of Montana, was my headquarters. Its door looked out upon a checkered pattern

of cultivated fields and virgin prairie. Frequently I had seen two Short-eared Owls flying over a field of wheat stubble in which young winter-wheat was growing. A systematic search of this field was at first without result, but the second time over it, while sitting on the ground to rest and to watch a ground-squirrel's burrow, I heard a slight sound behind me and turned just in time to see an Owl rising. With the greatest confidence I searched the vicinity but found nothing. Having given up the quest, I started toward home, but, obeying a sudden impulse, struck off at right angles and had gone only a few rods when a Short-eared Owl rose from the ground, scarcely thirty feet ahead of me. It flew slowly and without apparent concern; but at the spot from which it had risen was a nest containing three eggs. It was a slightly hollowed depression in the soil, partially lined with dried vegetation. This was on the twenty-first of May. On the twenty-sixth I revisited the nest and found five eggs in it. The Owl was incubating and she flushed at about the same distance as before.

Early in the afternoon of the twenty-ninth, finding the bird upon her eggs and no addition to her complement of five, I removed the Owl's eggs and substituted in their stead three hen's eggs which had been procured from a neighboring farmer. I had selected the smallest and whitest from the farmer's stock but they were far too large and much too long in shape and dark in color to resemble the eggs I had taken; for the Owl's eggs are pure white and more nearly spherical. The difference was so pronounced that I feared the Owl would not adopt them. The total area occupied by the three hen's eggs was however about the same as that of the five Owl's eggs; so I felt assured that the Owl could cover them properly if she would. After making the substitution I promptly left the field.

During the next two days I was away, on a side-trip to a distant alkaline lake, and the absence of any human being within three-quarters of a mile of the Owl's abode was doubtless a reassuring circumstance. When I returned she was sitting on the hen's eggs. She remained at her post while I walked around her in a circle of respectful radius. Following me intently with her eyes, she turned her head until I had described an arc of something like 270 degrees; then she reversed the twist, turning her head the other way around.

I was careful not to disclose my interest in her and left the place without flushing her.

A few days later the tripod tent, which was to serve as observation-blind and photographic studio, was placed at a distance of some eight or ten feet from the nest. This tent, of brown fabric fitted over an old camera tripod, formed a small triangular pyramid or tetrahedron, a shape which does not loom up in alarming proportions as viewed from the ground. From an interior point of view there is not so much to be said in its favor, for there is barely room inside of it to sit—Japanese fashion—beside one's camera. The tent was left for the Owl to become accustomed to it before any observations were attempted.

The first photograph was made from this hiding place on the seventh of June. The Owl had flushed from her nest as I approached the tent, but when I had been hidden a short time she began to fly around within sight of it. Soon she dropped to the ground and sat, at a considerable distance, peering curiously at the tent and bobbing her head, first up and down, then from side to side, in an intense effort to penetrate the mystery. She then flew up, and, alighting a few feet from the nest, walked to it, her body held in a horizontal position—not upright as when perching. She walked into the nest, pulling the hen's eggs under her with her bill, and settled herself to the task of brooding. The sun was hot and soon she opened her mouth and began to pant. Although her body pointed to the east she kept her head turned toward the south, for the tent was south of her and her suspicious gaze was fixed intently upon it. It was interesting to observe the response of her eyes to the changes of light. When the sun shown upon one eyeball but not upon the other, the pupil of the eye in shadow was considerably larger than that of the eye in sunlight. She frequently blinked her eyes; sometimes simultaneously, sometimes one after the other, and occasionally only one. The color of her eyes was pale yellow.

Her remarkably accurate sense of location of sounds soon became apparent, for whenever the slightest sound was made inside the tent, such as a faint scratching on a tripod leg with a finger nail, the bird shifted her gaze instantly to the exact spot whence the sound came.

She had come to the nest with a fluffy feather adhering to her lower mandible, and there it remained, for she was not concerned with such trifles under the unusual circumstances.

Again, four days later, although the weather was too windy for photography, I spent some time in the blind. The bird faced in the same direction as before. On this occasion she permitted me to make considerable noise, as I moved about in the tent, without leaving her nest. Before I departed for the day, I shifted the blind for the last time, staking it to the ground in its final position within arm's length of the nest.

With the tent at such close range it seemed best to let the Owl become thoroughly accustomed to it before disturbing her again. Accordingly no further observations were attempted until the morning of June thirteenth. On that day the Owl was very quiet and the fortunate coincidence of a lull in the wind and a whitish cloud over the sun permitted an exposure of a full half-second (with a lens aperature of F-8) and thus assured a fully-timed negative, which is not always possible when photographing birds at close range, with diffused lighting.

It had always been the custom of the Owl to go to her nest from the west side and to sit facing east while incubating, but on the morning of June fifteenth she faced toward the camera and thus posed for a different portrait. She often sat with her eyes half closed when there were no sounds to disturb her. Part of the time, when the sun was very warm, she panted. Her short plumicorns, known popularly as "horns" or "ear tufts," were usually not visible, but sometimes she erected them. At best they were very inconspicuous. They were approximately the same distance apart as the eyes, a "horn" being located on the top of the head directly over the pupil of each eye.

When I visited the nest at 6:30 (sun time) on the morning of June nineteenth the Owl flushed from three fluffy domestic chicks. She had removed all the egg shells from the nest with the exception of a few small fragments. A fresh-killed mouse lay on the ground at the nest rim. The chicks, which were of a brownish yellow color, looked quite vigorous. I left at once without disturbing them, but returned with the camera after breakfast. The Owl was again on the nest, with two chicks under her and one in front

1. Short-eared Owl on Nest, Gazing Suspiciously at the Tent.
2. Showing Small Size of Pupil of Eye upon which the Sun Shown Compared with One in Shade.

against the feathers of her breast. She was facing toward the east. As I approached too closely she flew suddenly from the nest.

I got into the tent as quickly as possible. The chicks of course could run about quite nimbly and soon they left the nest and came close to the tent, crying for their foster-mother. She returned after an absence of fifteen or twenty minutes, alighting within eight or ten feet of the nest and walking up to it, holding her body in the strictly horizontal position which gives such an odd appearance to an Owl. Settling herself on the empty nest she sat silently watching the chicks which remained near the tent; then she assumed a half-standing attitude in the nest and waited. Soon she became frightened or suspicious, probably the tent material was not sufficiently opaque, and with the sunlight behind it she had seen some movement within, at any rate she flew away. The chickens cried, slept and "whitted" by turns until I went out and put them to sleep in the nest. Before long the Owl returned, walking to the nest from the north-east side. She went part way into it, facing almost toward the tent, and half sat, half stood, with her wings hanging loosely at her sides, while the chicks cuddled up to her. One of them pecked at her bill; the other two went under her. After a little while two of the chicks left the Owl, to run about, close to the tent, but the remaining one staid under her for a long time.

When the chicks had been away from her for some time and I had come to the conclusion that she had no voice for them, I suddenly heard a low "cuk," somewhat resembling the "cluck" of a hen. Later, when the chicks were crying, she "cuked" twice. When they "whitted" she seemed satisfied to let them stay away. Eventually the crying of the chicks became too insistent and their Owl-mother called them, rapidly, with a series of "cuks" which merged into something like the alarm note of a hen, all the chicks running meanwhile toward her. Her "cuks" became higher in pitch as the chicks went under her, the last notes being high-pitched and very rapidly uttered.

At one time during the morning it was evident that the Owl was watching some bird directly above her, but I was unable to see from the tent blind, what it was. Once she called a sudden alarm note to the chicks.

She had a curious way of spreading herself and looking under her body, or of scratching in the nest hollow as she settled herself in it.

Once, when she was brooding, a chick poked its head through the rear part of her wing and climbed out by that route.

Having left my post at noon, I returned at 2:00 P. M. to find the Owl brooding two of the chicks while the third was enjoying itself in the cool shadow of the tent. The dead mouse was gone. I had brought some moistened corn meal to feed the chicks, and while I tried to induce them to eat it, both of the Owls were near. One was flying over me, delivering a tirade of barking notes, while the other sat on the ground, about a hundred feet away, uttering its "mayow" or "keyow" (sometimes drawn out to "ka-a-yów") with an impressive accent on the last syllable. When the Owl flew overhead, one of the chicks instinctively uttered its twittering alarm and all of them stood still. They would run to their Owl-mother on the ground, but they feared her in the air.

Before re-entering the blind I placed all the chicks in the nest but they would not stay. When the Owl came back she sat or stood in the empty nest; she deepened the hollow by scratching; she let her wings hang loosely and waited patiently for the independent youngsters. The latter went around the corner of the tent and I got them inside and put them to sleep between my hands. Meanwhile the Owl remained patiently at her post. When the chicks had been quietly pushed out of the tent she observed them at first indifferently, but when they fell to crying she "cucked" rapidly and all the chicks ran to her.

She endeavored to feed them, uttering a high pitched note and rubbing their backs with her bill, but they of course would not respond to the feeding stimulus; instead, they ran under her. At such times the Owl showed a slight swallowing motion of her throat and bill.

Occasionally the Owl repeated her performance of scratching and wriggling in the nest cavity, looking under herself, with head turned down, and then looking up again with a queer expression which might remind one of an old man peering over his glasses. Much of the time when the sun was hot, she stood in the hollow with her wings pressed against the ground like sled runners; thus

1. Owl and Chick with Dead Mouse in Foreground.
2. Chick Pecking at Owl's Eye.

she formed an open-fronted shelter under which the chicks might go or come at pleasure. They stayed under her, or slept outside, or ran around the premises as they pleased. Their world was a circle five or six feet in diameter and in most of this area they were quite at home, but they never ventured into the strange jungle of wheat-stubble which surrounded them. One of them ran out to the tent several times. I saw another catch and eat a fly. Sometimes a chick would reach up and peck at the Owl's eye, forcing her to close it, which she did without moving her head.

The Owl fondled or nudged the chicks again with her bill and opened her mouth. This time one of the chicks apparently ate something from her mouth. Again I could see her swallow slightly.

During the afternoon the foster-mother closed her eyes and dozed a good deal while she brooded her charges. All of the chicks were under her when I slipped out of the rear of the tent, about 6:00 P. M., well nigh exhausted.

The next day (June 20) upon making my morning call I found a fledgeling, beheaded and disemboweled, lying at the edge of the nest. The victim was a young Longspur, probably just able to fly. The Owl was brooding and one chick had its head protruding through the scapular feathers between her wing and back, while another was just in front of her in the nest. During the morning my photographic endeavors were stimulated to the utmost when one of the chicks climbed upon the Owl's back, but I did not succeed in recording this interesting picture.

In beginning the afternoon session I managed to stalk up to the blind from the rear without flushing the Owl. This time she sat facing north. Once again the chicks ran over her back, but for the most part they stayed near the base of the tent. They learned to drink from the shallow cup of water which I had provided, and during the afternoon I "fished" them into the tent and fed them with corn meal.

Periodically the Owl scuffled around in the nest, to relieve the tiresome monotony of brooding. When the chicks were around her she fondled them with her head, but when they came rushing up to her from a distance, in a manner which she did not approve, she soughed or hissed at them—a sound evidently not made by the vocal chords but by the rapid expulsion of air through the open

bill. She had an exceedingly high note, a series of squeaks in reality, to which she gave utterance while fondling the chicks against her face.

Again the next morning (June 21) I attempted to stalk up to the tent unobserved, but the Owl flushed. The chicks "froze" in their places as she rose into the air, but remained thus for only a short time. The lining of straw, all of which was scratched out of the nest cavity the preceeding day, had been replaced and the nest was now well lined. After feeding the chicks I spent a short time in the blind. The soughing hiss of the Owl, previously mentioned, is doubtless a warning or an expression of displeasure, for she repeated it, directing her attention toward the camera lens, when my shutter made a whirring noise in releasing.

In the evening, after supper but before dusk, the chicks were fed again. When I arrived I found one of them inside the tent, crying, and unable to get out, but the Owl was brooding the other two. While I fed the chicks, both Owls flew around and above me, "barking" and "mayowing." One of them alighted in the field about two hundred feet away and for a short time kept up a very high pitched squealing cry, which presumably was meant to imitate a bird in distress.

Next morning when I took more cornmeal to the chicks, both Owls were at first quite demonstrative in the air. Then one of them floundered about on the ground in ostensible helplessness, uttering its squealing notes, while the other sat on a large weed and watched. The floundering one was perhaps a hundred feet away.

There was some rain during the day of June twenty-third and my only visit to the nest was in the evening. A calamity had befallen the little family. The most precocious chick lay dead in the wheat stubble about twelve feet from the nest, its crop distended with wheat kernels. The second chick lay helpless three feet from the nest, with its legs stretched out behind it. The third chick however was under the Owl apparently well and happy. The sick one was taken to the house but did not survive its gluttony for wheat.

In the morning (June 24) the Owl family's larder was well supplied. The carcasses of a mouse and another young Longspur had been placed at the edge of the nest. I suppose that these

supplies were brought by the foster-mother's mate although I could not verify that point. The surviving chick was apparently in good condition. When the nest was approached the Owl contracted herself in a manner which made her head seem amazingly small.

From the twenty-fourth until the twenty-seventh I brought food for the chick each day. Always the faithful foster-mother was at her post. In the early afternoon of the twenty-seventh, when I cautiously approached the nest, the Owl was preening the feathers of her breast while the young chick sat contentedly upon her back. She flushed as I came up. I entered the tent and remained an hour and a half, or perhaps two hours, but the Owl did not return.

At nine o'clock the next morning (June 28) I made the usual visit with the chicken feed and found the chick inside the tent. The Owl was not anywhere to be seen, though a large fresh Owl's feather was in the nest. I put the chick out of the tent and left the place immediately.

Soon after noon I returned and found the chick near the nest; but the Owl was not there. The weather was turning cold and by five o'clock it was very cold and windy and threatening rain. The chick was then half squatting, half standing, by a bunch of stubble at the edge of the nest, trying to sleep. The Owl was nowhere to be found. I made a circuit of the surrounding portion of the field to look for her. The weed which had so often served as a lookout was deserted. I took the chick to the house with me together with the tent and other paraphernalia, and although I visited the stubble field afterward I did not see the Owls again.

The Owl seemingly abandoned the chick when it was ten days old, but its independent actions, so different from the habits of Owls, may have led her to suppose it capable of caring for itself. The human factor which was injected into the Owl's affairs must also be considered. She would doubtless have remained with the chick much longer had it not become accidentally imprisoned in the tent. It had probably spent the night there while the Owl sat, childless and to no purpose, on the nest. The fresh feather found in the nest the next morning was evidence that the owl had

been there. Surely she had reason to believe that the chick had deserted her.

In any event, this outcome must have been the ultimate one, and it is not likely that more could have been learned through a more prolonged foster-parentage.

It should be remembered that the altricial young of the Owl are born from the egg shell, blind and helpless, unable to stand on their feet, and entirely dependent upon the parent birds for sustenance. In contrast, the precocial young of the domestic hen are able to run about and pick up their own food soon after they are hatched. It is not altogether surprising therefore that the Owl as a foster-mother exhibits more patience and self-sacrifice, and even perhaps a more demonstrative affection in the care of her foster-children, than the hen exhibits toward her own offspring.

Observers of birds sometimes jump to the conclusion that a foster-parent, in accepting the eggs of another species without show of concern, thereby demonstrates an inability to recognize her own eggs. It would seem that such a conclusion is by no means justified. I do not flatter myself that I fooled the Short-eared Owl with the hen's eggs. She was of course incapable of reasoning as to cause or effect involved in the mystery. Her most powerful impulses sprang from the maternal instinct. This led her to adopt the strange eggs, in the absence of her own, and to devote her untiring mother energies to the care of the amazing chicks which hatched from them. She could not abandon these strange foundlings so long as they were dependent upon her. Such, it seems, is her law.

For the benefit of those inquisitive persons who wish to know what became of the chick, be it here recorded that the chick "lived happily ever after." At least to my knowledge it grew to fine brown pullethood. Until it was well feathered it lived the life of a solitary pioneer, never venturing more than a few feet from my cabin. Its chief diversion was fly-catching; indeed it developed this pursuit to the proportions of an industry, running back and forth for hours, in pursuit of the flies which settled in the shadow of the house. It had become remarkably inured to wind and changes of temperature. In its infancy the monotony of its existence was one day nearly cut short. Hearing its urgent cries, I ran out just

1. Wings Pressed down to make a Shelter which Chicks Entered at Pleasure.
2. Owl Rummaging Nest and Looking under Herself. Chicks under Wing.

in time to rescue it from a ground squirrel (Richardson's Spermophile) which had laid hold upon it and was about to carry it off.

Eventually the chicken was delivered to the farmer's wife who had supplied the eggs, so that presumably it was privileged to associate with its rightful mother in the barnyard. It is safe to say that the old hen never knew it, even though we concede the farmer's assertion that it "favored her" in appearance, much more than it did the Owl.

327 S. Glenwood Ave., Springfield, Ill.

NOTABLE MIGRANTS NOT SEEN AT OUR ARIZONA BIRD TABLE.

BY FLORANCE MERRIAM BAILEY.

Plate XXIII

I. THE FIRST LAP OF THE MIGRATION.

SEEDEATERS such as Sparrows and Doves might naturally be tempted by the offer of a seat at a bird table and in arid Arizona it would not be surprising if a variety of birds came for water. That a Flycatcher—a Cassin's Kingbird—should be one of these and that a Warbler—a Long-tailed Chat—should come for raspberry jam might seem a trifle anomalous, although a day of dry insects and a suddenly discovered sweet tooth might serve to account for them. But most of the insect-eating Flycatchers, Warblers, Orioles, and Vireos, together with the flesh-eating Hawks and Kingfishers, and above all such birds of the air as Swallows, Nighthawks, and Hummingbirds fall in an entirely different category from Sparrows and Doves—a bird table would be a far cry to them. While we did not have the pleasure of numbering them among our Santa Rita dinner guests, many of them visited camp and others were seen about the ranch not far away.

The first of the homecomers which we saw, the bird that heads my migration blank under date of March 5, 1921, was that beautiful Swallow of the western mountains whose name—the Northern Violet-Green—merely suggests the remarkable color combination

it turns to the sky, solid cloth green, black, and purples that run the gamut from dark blue to warm pinkish violet, an exquisite bird which you watch intently in the sky above you in the eager hope that at some turn it may swoop low enough for you to see its famed coat of many colors. The one we saw first was flying so swiftly over the mesquites and catsclaws below camp that only its snowy under surface and the white rump patches that serve as a directive mark could be seen. Some three weeks later two small flocks, one of six Swallows, were seen nearer by, the six over the stony, cactus and candlebush (*Fouqueria*) ridge above camp, perhaps on their slow way up the mountains.

Before the first homecomers appeared, Nature had begun to prepare the feast for them. As early as the first of February, some of the abundant misletoe was found in bloom, and as it came into full bloom, exhaling its rich fragrance, it was surrounded with buzzing insects. On the twenty-second of February, down in the warm river valley at the foot of the mountains, when looking up in a sycamore top for one of two Gila Woodpeckers busy in the tree I started, for there—on this midwinter day—against a background of soft beguiling blue sky, big beautiful golden buds were bursting into yellow tassels. Such a vivid, radiant picture! I can see it now and feel the thrill of its exquisite color and the warmth of its joyful promise. Spring had crept upon us all unawares, banishing winter from the valley. One of the Gilas was already investigating the newly opened flowers, and after that, as leaf and bloom came gradually up in the mountains, insect hosts gathered about the flowers and the birds came from the south as if bidden to the feast.

Three weeks after the big sycamore buds were seen bursting in the valley, the middle of March, a plain little greenish-yellow Warbler of the Orange-crowned group was discovered early one morning in a blooming sycamore top at camp and hailed as our first Warbler migrant. Soon others of his kind came and their migration swelled until the trees seemed full of them. In March they were seen most commonly flitting about the mesquites and sycamores, and in the sycamore tops which were humming with insects they and the Audubon's Warblers, some of which had spent the winter with us, had to be picked out carefully in the confusion of the large old seed balls, the small pistillate balls, the staminate

flowers, and the new green leaves, Especially was this true of the Orange-crowns, for their greenish back and yellowish rump and under surfaces were easily camouflaged by the greenery. In April the busy little Warblers were seen in the later blooming, tassellated oaks, daintily picking insects from the undersides of leaves with their finely pointed bills, and occasionally dropping to the ground to hunt over the brown leaves. One was seen hunting among the pink blossoms of a small peach tree—the trees of the valley were in full bloom in February and two young trees near our gate were full of bloom in early March, attracting handsome velvety black butterflies with prettily contrasting red and metallic blue spots on their tails.

When the migration of the Orange-crowns was at its height, with the perversity of human nature I began to lose interest in them, for whenever a bird that might be new and strange stirred in the thick live oak tops it almost invariably turned out to be either one of them or the Western Ruby Kinglet which had been with us all winter. By the end of six weeks, however, their migration had waxed and waned until, on the second of May, it was a matter of note that two were still left to be seen.

About a week after the first Orange-crowns appeared, another Warbler, the Black-throated Gray, with its clean, clear-cut black and white stripes and patches conspicuous in the thin-leafed mesquites and catslaws, reached us, and gradually increased in numbers, being fairly common during most of April, although it was never so common as the Orange-crowned. It seemed to be always craning its neck reaching after an insect, which perhaps accounted for its seeming longer and more slender than the plump Orange-crowns and Kinglets in the same oak tops. Sometimes it dropped down through the air and would fly up with a snap of the bill, returning to a branch to shake and eat its insect.

These were both old friends of the field, bringing us pleasant reminiscences of California and New Mexico, but by the middle of March another migrating Warbler had appeared, a new and wonderful bird to me, the spectacular, theatrical Painted Redstart, which comes up from Central America just far enough to grace the mountains of Arizona. Unlike the other Warblers it never became common, three being the largest number ever seen at a time; but

one was enough to set agog both camp and ranch. Its black plumage which in the sun had the exquisite silken sheen of that of the Phainopeplas might well have been given its strikingly contrasting snowy wing patches and outside tail feathers as well as the appropriately rich carmine breast by the careful hand of an artist deliberately painting a feathered masterpiece. What matter if the artist were Mother Nature working through long ages to produce masterpieces which should stand the test of time, in which plume and habit of life were so harmoniously adjusted that the race could not fail to be perpetuated. As if actually conscious that its protecting blackness would effectually hide it in the dense shadowy oak tops and as if knowing that at all hazards it must not be lost from its kind, it fairly flaunted its white plumes, going about with wings drooping to display their white patches and its long fan tail widely spread to exhibit the open shears of white. The white of the eyelid might well have had its use when two met in the shadows, but it seemed a trivial detail Nature had added gratuitously. Suppose the manner of carrying the wings and tail were best suited to effect sudden Flycatcher-like sallies after insects—is it then unusual for Nature to make one device serve two ends? The actions of two seen among the live oaks of the ranch the last of March suggested courtship display. To be sure they may have been quite unregardful of each other's presence and their actions nothing out of the ordinary, but what flaunting of plumes, what mad chasing through the oaks, what incessant opening and closing of the white tail shears!

In catching insects they often dropped through the air or made downward swoops in conventional Redstart and Flycatcher-manner and once one dropped about twenty feet to catch on a hanging rope and then on a vine that swung with it prettily; but in the main they hunted in the sycamore and live oak tops and markedly and perhaps preferably on the great slanting trunks of the live oaks where the crevices of the bark seemed to supply a ready feast. Even in the mesquites a Painted Redstart was seen flying from one trunk to another. On the oaks, when the long black and white fan tail was outspread against the bark the suggestion was of a museum specimen, a pinned-out gorgeous butterfly. Another interesting pose of the Redstart's suggesting a close scrutiny for

insects was a forward tilt of the body with the black crest raised enquiringly.

In hunting habits a combination of Redstart, Flycatcher, Creeper, and Sparrow, this individual bird may be seen hopping over the ground or hopping and flitting lightly up the side of a slanting tree. This surprising characteristic was illustrated one day at the ranch. After a tour of the live oaks a sudden gleam of the rich carmine which glows under a stray sunbeam, together with a rich contralto call announced the Redstart's descent to the corrugated iron roof of the old adobe ranch house. An apparently unexpected answer to his call from the mesquite overhead was greeted so joyfully that it seemed for a moment as if he would forget about dinner and fly to his comrade. But it was getting late and he must keep at work or go hungry to bed. So he proceeded to hunt over the roof, hopping from one corrugation to another on his short legs as a man walks ties, occasionally skipping one or making a misstep and dropping in between. He partly crossed the roof twice with his droll short-legged hops, picking up a few tidbits as he went. Another time when two of the birds were seen hunting near together they separated, perhaps to keep to unworked territories.

The rare pleasure of watching these unusual and fascinating Painted Redstarts was ours at intervals for nearly six weeks, for while they apparently went on up the canyon on warm days, they drifted back on cool days. Once one was reported to me by the ranchman's wife during a warm wave and when I expressed my surprise she assured me that he was "hopping around as happy as he could be," which expressed one's natural reaction to this gay little messenger of spring.

Migration was now well underway. On the middle of March when our neighbor was rounding up cattle in a canyon where there was piped running water, he saw a flock of migrants which were passing high through the sky interrupt their flight by circling down to the stream to drink, after which they circled up again and continued their course.

At camp so many new birds were arriving that the first thing in the morning I looked from the tent door to the sycamore tops, after which I went down to the ranch to look in the live oak tops

to see what had come in the night. All three Orioles—the handsome lemon-and-black Scott's, the black-faced Hooded, and the orange and-black Bullock's were discovered in the tops of the white-trunked sycamores, piping up with a loud Oriole whistle or picking carefully about among the young tender green leaves.

A small Vireo whose early morning song was a rapid *chickaty-chickaty-chickaty-chee*, and whose jerked out *chickory-chickory-chee-ah* reminded me of the "*chick-a-de-chick-de-villét*" of the Bermuda White-eye, proved to be the brown-eyed Least Vireo. When pursued it kept low in the dense thorny thickets where on our approach its song would stop and it would presently appear beyond. A vertiable Will-o-the-wisp it seemed, tantalizing us with its White-eye song. As time went on, however, it apparently got used to seeing us around the tent and finally a pair were noticed going about together quite indifferent to our presence.

Another wandering voice was a puzzling mystery at the time but on our return from the field was recognized by Mr. Frank Stephens' description of the song in the 'Nuttall Bulletin,' as that of the Beardless Flycatcher, with only a few records to its credit this side the Mexican line, several of those being not many miles from our camp. The plaintive minor notes, the first five slowly descending the chromatic scale ring in my ears to-day, recalling vividly our days of tent life among the mesquites in sunny Arizona; for the striking song with its many variations was heard around camp day after day for about a month. Like that of the Least Vireo it came mainly from the mesquite thickets, but on several notable occasions we were favored with a good view of the small gray bird when it showed all the earmarks of a Flycatcher.

Various other Flycatchers and Vireos had been seen by the first of April, among them the Swainson's Vireo, the Ash-throated Flycatcher and the Cassin's Kingbird, the Cassin's announcing itself by its loud familiar *'ka-wheer'* from the sycamore top.

Besides the two Doves that came to the bird table, the Inca and the White-winged, and the Mourning Dove which was seen on rare occasions during the winter not far from camp, a fourth was seen on the first of April as we sat at breakfast in front of our tent—a powerful-winged bird with a square, cut-off look compared

with the long-tailed Inca and Mourning Doves, whcih flew swiftly overhead making me exclaim, "Band-tailed Pigeon!" Another was seen the next day also rushing up the canyon. One of the pleasantest meetings was was with the Townsend's Solitaire, an old friend of the high mountains of California and New Mexico, found in late March in the live oaks above us. Near the middle of April another New Mexico acquaintance was seen flying over by Mr. Bailey who hurriedly called me to the tent door exclaiming, "A Zone-tailed Hawk—I saw the white bands on his tail!"

But most delightful of all was the return of the Hummingbirds. As early as the thirteenth of March when a few pink pentstemons were the only spring flowers we had discovered, I was thrilled by the whiz of a Hummingbird passing swiftly over camp. A Hummingbird already! Spring had come to the mountains! A few hours later, with the characteristic rattle of the Broad-tailed it came back as fast as it had gone, the few pink blossoms evidently not holding its attention. But in the next two weeks there was an awakening in the plant world. On windy days the old brown leaves of the live oaks rained down so thickly that the ranchman had to rake them up. Then in a gray thicket of unleafed trees an ash blossomed, its clusters of green leaves and green terminal pistillate flowers contrasting so strikingly with its brown seeds from the previous year and with the surrounding bareness that pilgrimages were made to it to enjoy its beauty and spring promise. After that the ranch fig trees, and the black walnuts, sycamores, mesquites, and catsclaws began to leaf, and around camp there was a pleasant prophesy of greenness.

Hummingbirds were frequently seen darting through the air and whizzing past camp, but always too high or too fast to determine the species. In a rich Hummingbird country to be right in their path and yet unable to see them was too aggravating. They were looking for flowers. Why not give them some to bring them down where we could see them? We went out and gathered some of the vivid pink pentstemons then lighting up the dark places under the mesquites and potting them in cans started a Hummingbird flower bed in front of the tent door. The reward was one Hummingbird seen flashing his colors for too short an instant for identification and then compacently seating himself on a twig with

his back to the tent. The idea was a good one but other flowers were needed. By this time the candlebush was coming into bloom, some of the tips of its long rods having already burst into flame. Climbing the stony cactus-strewn bench above us to get them, we brought down several of the scarlet-tipped spikes. After sticking them into the ground—one went deep down a gray tarantula's hole—while Mr. Bailey was adjusting a tripod to hold a basin of water beneath them, right over his head buzzed a Hummingbird. Quick work! To add color to attract passing eyes, I tied a red scarf around the tripod, and we withdrew with high hopes. The device was decidedly successful. Had we been in camp all the time we would probably have seen more species, but that was not the fault of the species. Green females or immatures came quite freely, and occasionally a handsome adult male delighted our eyes. A Black-chinned with his velvety black and violet gorget, a Broad-tailed with bright bronzy green head and deep rose-pink throat, and a third that suggested the Costa's but flashed away all too quickly for sure identification, came and buzzed about the red flowers. Others which were probably halted in their head-long flight by the flower bed whizzed around the tent, and once two stopped only a few yards from us to have it out bill to bill in air—one with the brilliant pink flaring ruff of Costa's—so absorbed in their fencing that they quite disregarded our presence. Another morning, when we were breakfasting in front of the tent, in our migrants' sycamore top looking down on us we discovered a large Hummingbird with a long dark tail and apparently a glint of blue on the throat, which reminded Mr. Bailey of the Blue-throated seen in New Mexico and Texas.

2. Snowbound Migrants Driven to Sanctuary.

The first migrant noted at our Santa Rita mountain camp, as I have already said, arrived on March 5, and during the following month twenty-five species were listed, among them five Hummingbirds, five Flycatchers, three Orioles, one Swallow, three Vireos, and four Warblers. In fact, migration was in full swing when, on the afternoon of April 4, after very severe winds it began to rain and hail and finally snowed. Just before sundown when it was snowing hard, the Canyon Towhee, who was a familiar bird-table

and tent visitor came to our door with an eager call. As the flaps were tightly closed to keep out the snow he could not get in and flew up on the side of the tent calling so insistantly that I opened the top of the flap a crack. In a few moments he appeared there with crest up and after giving his cheerful chirp looked down inquiringly and then dropped to the floor to hunt for the rolled oats scattered for him. When he had gone I hurried out to the feeding table and after scraping off the snow put out enough for all the hungry flock. The next morning our pretty brown-capped visitor again called at our door, strong in the faith that all his wants would be supplied. When he had had his breakfast and I threw back the tent flap, one could have imagined it a beautiful winter scene in the north, for above the white earth, every bush and tree was laden with snow. About two inches had fallen and around the tent where the night's accumulation had been shaken off, arousing memories of roof shoveling in the north country, there were white piles seven inches high.

When I was starting out to see what birds had taken shelter in the big live oaks in front of the ranch house, I was thrilled to see a little wanderer from below, a Vermilion Flycatcher with his globular flaming crown and puffy scarlet breast, come flying from our gate straight through the air toward me as if to meet me—the gorgeous full-blown scarlet blossom! Swerving only slightly from his course, he lit in the mesquite at the corner of the tent. A strange picture he made there, his red breast standing out against the white snow as he perched among the new tender green leaves of spring.

When I first reached the live oaks there was a short interval of sunshine that set the birds calling and singing, although the voices I noted were mainly those of the old residents whose winter in the mountains had perhaps put them in braver temper than the newcomers from the south. The strident call of the Woodhouse's Jay, the nasal cry of the Gila Woodpecker, the busy chatter of the Western Ruby Kinglet, and the soft liquid call of the Phainopepla were heard; while the superb Arizona Cardinal which had been in full spring song long before this piped up cheerfully as if it took more than an April snowstorm to affect his spirits. The camp Mockingbird was silent as he flew into his favorite grape vine

but its small new leaves barely veiled the lodged snow beneath and snow apparently is not to the liking of this Nightingale of the south. A Palmer's Thrasher, another familiar of the neighborhood, while keeping discreetly silent as was his wont when about the premises, was taking advantage of an island of brown on the white ground, hopefully raking the earth with his long curved bill.

While the sun lasted one of the newcomers, the little Beardless Flycatcher from Mexico, was heard giving his minor descending notes with which we had become familiar in the three weeks since his arrival.

But soon the sun was darkened and the snow was falling so fast that it was hard to keep eye-glasses and upraised field glasses dry enough to see through. They had to be used, however, for the tree tops were fairly astir with Kinglets, Vireos, Flycatchers, Warblers, and Orioles, the big oaks and the protecting thicket adjoining them serving as sanctuary from the worst force of the storm. Once when an unusually strong gust came driving in from the southwest the flock shifted farther inside the trees for better protection.

It was fascinating to pick out one by one from among the host—now a friend of the winter, now a spring arrival which perchance had already been welcomed but which had passed on up the canyon, and, most exciting of all, among the newcomers of the day to discover some bird actually new to one's experience. On the trunk of one of the big live oaks might be seen a Gila Woodpecker, turning over his scarlet-patched brown head to better examine the cracks of the bark, while from among the moving host, half hidden by the snow and the darkness of the dense tree tops might be discovered a dainty Black-throated Gray Warbler which had come two weeks before, looking up and turning his head over as if consciously showing off its pretty black and white stripes; or one of the small Orange-crowns which had come three weeks before and swelled in numbers until seeming to be everywhere among the flowers and fresh green leaves of the tree tops. Once a sedate Vireo very different from the jaunty little Least, having the green cast of the Cassin's was eagerly set down as a new arrival. Two of the large lemon and black Scott's Orioles which had not been noted for ten days were greeted with enthusiasm—it was

not necessary to wipe the snow off your glasses to see and appreciate their beauty.

Two small Flycatchers flitting about among the oaks puzzled me sorely until one considerately lit on the top rail of the ranch corral showing its brownish back and flew across the corral showing the unusual buff which has named it the Buff-breasted Flycatcher. As it was the first I had ever seen I exulted over even that fleeting glimpse. But that was not the best. Back and forth low through the trees along the road leading to the corral, with short flights went a large Flycatcher so unafraid that he let me come near enough to con all his unfamiliar remarks, which when looked up proved him to be the Coues' Flycatcher, the Mexican counterpart of the familiar Olive-sided Flycatcher—my second new bird for the day. As he went and came letting me follow close behind him, he uttered a slow, plaintive, easily-imitated cry that I whistled after him with growing interest and absorption. Sad-voiced friend of the mountains! Had he reached his summer home in the canyons above us only to be driven down by the snow that covered the mountains? However, that may be, when the storm was over he left and was never seen again. Long after he had gone his simple notes with their penetrating plaintive quality rang in my ears and I found myself repeating them over and over as a lament.

Two new birds in one day! As I walked down the road between the trees thinking over my blessings, happening to glance up, clinging to the underside of a branch like a Woodpecker, right over my head I discovered a Painted Redstart with widespread black and white wings and tail, one of those whose presence had delighted us on cold days ever since the middle of March. My cup seemed full. Later in the morning another of these delightful birds was discovered. While the trees above were alive with birds, several Green-tailed Towhees, one of which had frequented the bird table all winter, and also a fresh invoice of Alaska Hermit Thrushes, one of which, if it were the same subspecies, had been seen about the ranch all winter, kept appearing from the shadowy ground and along the dry wash as if a flock had been overtaken by the storm on its way north. And under one of the oaks the gray head and yellow breast of the first Macgillivray's Warbler of the season were recognized with pleasure.

During most of the snowy afternoon one of the two Vermilion Flycatchers seen chasing each other in the morning, perhaps the glowing scarlet one which had come flying up to camp, acted like a familiar little home body instead of a royal beauty, making himself at home under the big live oaks in front of the ranch house, where he was watched with pleasure from the windows as he went about flycatching over the snow-patched ground, or over the puddles made by the melting snow, once shaking an insect with his whole person before returning to his low oak branch. Hour after hour he hunted busily from place to place infrequently giving a thin call—*ee*— and taking short rests on good observation posts between flights, his notched tail and his drooping wings ready for a sudden start. A bare bush on the edge of the gulch was one of his favorite perches and a large stone near by also served for a lookout. At times he flew down into the bottom of the gulch for an insect his bright eyes had detected,lit on a twig over the pump, on a horizontal pipe, on the handle of a wheelbarrow, or on the same hanging rope the Painted Redstart had discovered. Once he rested in the shelter of the dry ventilating space under the roof of the adobe ranch house, looking out comfortably upon the falling snow. Another time he sat on a log with feathers fluffed up, looking as cold as I felt. Again, when he had flitted from the ground at the foot of an oak to its trunk and then onto the arm of a big chair standing with summery suggestion under the tree, a ray of sunshine — the third on that day of gray sky and snow, as if in playful fancy, lit up his raised crest till the gay scarlet globe glowed.

In his sallies the little beauty was quite preoccupied, and if he gave it a thought, apparently took the stationery or slow-moving, mackintosh-clad figure for a harmless form of tree trunk. To test him I walked up slowly within about ten feet of him when he flew, only to light overhead a few feet from me with his back turned as if wholly indifferent to my presence. At last he flew directly toward me as if to light on the black tree trunk, and looking up before he quite reached me merely turned aside to a better perch, on a neighboring weed top.

Before sunset, when the storm was over and the birds which had taken shelter in the sanctuary had scattered, we went down

into the mesquites below the ranch where we found a Painted Redstart and also a Lucy's and a Virginia's Warbler, migrants seen for the first time, which had very likely shared the protection of the sanctuary but been overlooked among the dense tree tops.

The temperature during the day of the storm ranged from 35° to 44° and the morning after, there was ice a quarter of an inch thick on the bird's water pan. While the storm was a short one, in that year of tragic drought the inch-and-a-quarter of water which it brought spelled relief to the stock left alive on the range and hope to the anxious cattlemen of the country. For the Santa Ritas were white down to their low foothills on the plain, which meant new life to the springs and water holes. On the heights the evergreens were beautifully silvered and the snow lasted some time, but at our level it melted quickly and in spite of cold days the migrants kept on coming. As before the storm, the Painted Redstarts came back on the cool days until nearly the end of April.

But what had the Hummingbird done during the snowstorm? Did they speed on their strong wings to the valley when the cold wave came and speed back when it was over? None were seen during the snowstorm but the day after a Black-chinned was found feeding from the tubular, orange-colored honeysuckle (*Anisacanthus*), which grew among the mesquites, and the following day one came to feed from our candle flowers which had been piled high with snow the day of the storm.

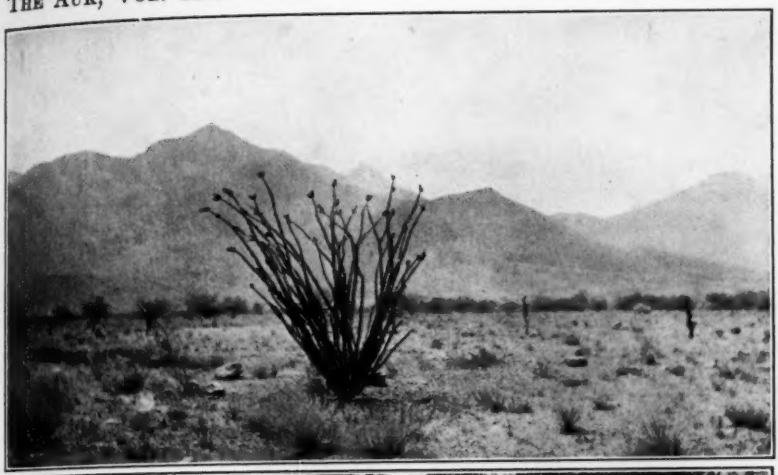
3. One of Nature's Feeding Tables.

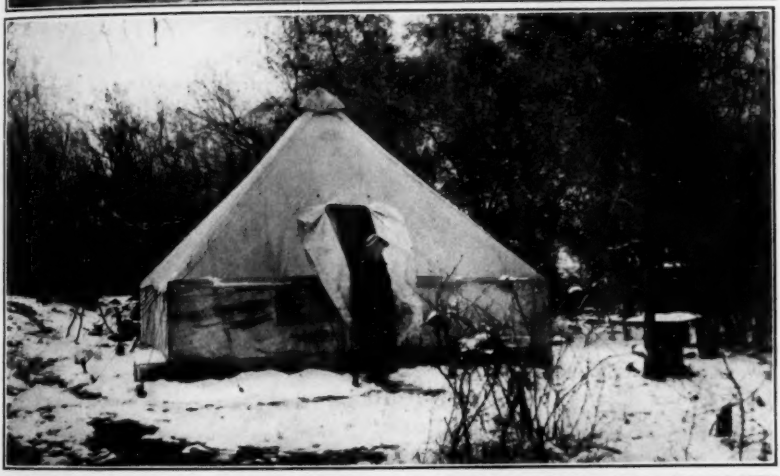
The candlebushes or ocotillos were soon blooming freely on the foothill slopes above us calling a variety of hummers and other birds to feast on their abundant honey and the many insects which gathered about their flowers. One conical hill was so closely beset with the candlebushes that we dubbed it Fouqueria Hill. Before the leaves came out the hissing of the wind through the thorny rods could be heard from a distance. From the east slope of the hill I looked down over the landscape through a network of long interlacing rods, each with a fire-tipped torch. While waiting for Hummingbirds, I studied the novel screen with interest. Some of the torches flared against a distant background of green mes-

quites on the slope beyond, some of the long arms crossed the straw-colored Range Reserve still lower, while others yet cross-lined the blue-gray faces of the distant Rincon and Catalina mountains rising from the valley below. In detail the rods were most interesting. Their bark adapted to desert life with its tight, hard, cellulose cuticle, waterproof and evaporation proof, split in growth so that it produced green striations. Heavy protecting thorns down the length of the rods as the season advanced were spaced by clusters of oval leaves which gave just green enough to afford a pleasing contrast to the terminal scarlet spikes. The individual tubular flowers of the spicate racemes suggested tiny boxes squarely and as tightly closed at the top as closed gentians until ready for winged visitors, when their waxen lips opened, disclosing richly fringing stamens with pollen ready to be transported by bird or bee.

When the Hummingbirds visited them, mainly in the early mornings and late afternoons, their characteristic mannerisms could be easily observed. A Black-chinned which came probed the tubes in a business-like way with needle held down almost vertically, his wings extended and whirring so rapidly that their form was blurred, only the top and bottom lines of the strokes being visible, while his tiny feet were tucked up in his feathers or closed tight-fistedly below. As he fed about the red flowers his white collar showed as a good field character, contrasting conspicuously with the dark underparts and velvety black gorget. One of the long rods accidentally bent in the middle afforded an inch or two of horizontal perch which the midget was quick to take advantage of, perching there undisturbed while the rod swayed in the wind.

While I was sitting canopied by the interlacing rods watching the Black-chins one afternoon, a Hummingbird came rushing down the candlebush slope with a loud peculiar clicking noise entirely new to me, quite different from that made by the Rufous or the Broad-tailed, and probably made by the Broad-billed. One of the beautiful adult males with peacock-blue throat and peacock-green breast had been secured by Mr. Bailey on the slope the day before and soon after the noise was heard a female Broad-bill came and lit on a candlebush so close to me that I could see





1. Candlebush or Ocotillo (Fouqueria splendens).
2. After the Snow. Humming Bird Flower Bed in Foreground.
3. Live Oaks where the Painted Redstarts Hunted.

her wide, livid-red bill with its blackish tip and also the white streak back of her eye. Her tail held her up with its rapid pump-handle motion as she probed the open, stamen-fringed flower tubes. Although silent when probing she made a slight clicking noise in flight. While I sat there under the candle bushes, White-throated Swifts passed overhead, a tarantula killer flew by and a big shining black beetle came and fed from the flowers.

A variety of birds was seen among the ocotillos at different times. A Sparrow Hawk was discovered using one as a perch, probably because it was the highest thing in sight. A House Finch whose sweet song was heard among them may have stopped in passing or may possibly have come for nectar as one was seen in another place helping itself to the juicy cactus (*Viznaga*) fruit. Another finch, the Green-backed Goldfinch, was seen perching in a candlebush. One of the Crested Flycatchers was noticed working its way through the forest of rods and a Scott's Oriole was found feeding from the red flowers. Two male Hooded Orioles stretched their necks as they explored for insects and one that swayed on a rod showed its black-faced yellow head and black back to advantage. One was seen actually perching on the red raceme probing the flowers. As they worked they occasionally gave their single note and their chattering scold. The nasal *tang* of a Gnatcatcher was heard from one exploring the thicket. Several Warblers were found at different times, the Black-throated Gray, the Audubon's two of the Orange-crowns, one of the Pileolateds, and the Painted Redstart, its own little red flame going well with those of the candlebushes as it lit on a rod near the flowers.

In the late afternoon as the sun sank and the shadows crept down the hillside the green rods grew dim, only the outstretched red candles showing above the shadow; while in the landscape below, the foothills of the mountains lowered to pinkish brown hills and Huerfano, the pyramidal orphan butte standing alone on the plain, showed one face in black shadow. The Hummingbirds having gone for the night, I started down to camp. As the trail dropped below, I turned to look back where the torches flamed against the dark background of seamed mountain walls.

4. LOITERING MIGRANTS AND HOME-MAKERS.

Before the candlebush came into bloom around us, as early as the middle of March, a desert tree was delighting our eyes on our trips down through the giant cactus country—the palo verde, a solid mass of vivid lemon-yellow bloom, gorgeous in the sunshine. Soon after, in the valley bottom the richly fragrant elder blossoms delighted our nostrils. And then, the middle of April, on our own freshly green mesquites the tassels began to yellow.

The later migrants were now appearing. An Olive-sided Flycatcher was noted on its way to the north the last of April, its mountain home not abounding in insects so early in spring. For similar reasons, it may be, the handsome Golden Pileolated, the Townsend's, and Hermit Warblers were seen loitering along their way; while a Nighthawk,perhaps waiting for warm weather to produce an abundance of the small high-flying aerial insects, was not seen until the first of May. A Poorwill, a wandering voice of the dusky shadows, had been heard about the middle of April, large low-flying moths beetles and grasshoppers, of which fewer would be required, being sufficient for his needs earlier in the season. Our most inappropriate visitor, a Belted Kingfisher, perhaps bound for frozen mountain streams was discovered the last week in April, perching footlessly over our "dry wash." He soon saw his mistake, however, and went rattling up the canyon.

By the sixth of May when we left the mountains, the main spring migration had waxed and waned, the homecomers bound for the north having largely passed on; while some of those which had come back to the Santa Ritas for the summer. together with those which spent the year in the region, were beginning to nest. The White-winged Doves were courting, the Verdin and Least Vireo were seen going about in pairs, fresh Cactus Wren nests were discovered underway, and two Hummingbird's nests, one a Black-chinned and the other presumably a Broad-billed, were found practically completed. The Scott's and the Bullock's Orioles had been seen in camp only on their way, but the Hooded had returned home. A pair had evidently established themselves in the sycamore by our tent as both birds were seen in its top. And one morning about the first of May we were called out of the

tent by the excited cries of the old male who was trying to drive off a persistant young one who had appeared on his premises and who had to be chased out of the tree again and again. Then two fresh-looking cup-shaped nests of the shallow Hooded type were discovered in the leafy sycamores opposite the ranch house, and the birds were seen flying busily around.

The mesquites which had now come into fresh green leaf were fragrant with yellow tassels. And here and there big cactus flowers were to be seen. The desert was putting on bridal garments.

1834 Kalorama Round, Washington, D. C.

REASON AND INSTINCT IN BIRD MIGRATION

BY N. F. LEOPOLD, JR.

IT IS a well known fact that every species of animal, having had its origin in a very small section or territory, tends to spread farther and farther in all directions from its center of origin. This gradual spread continues until progress is checked by a barrier of some variety. This entire principle has been summed up under the zoological law of "barrier control dispersal from a geographic center of origin."

It is very easy to explain this tendency, and the resultant gradual extension of range of resident animals, but when we attempt to carry our explanation further, to the extension of migration ranges in birds for example, we are confronted with a more difficult problem.

In the case of resident animals it can easily be understood why this tendency must exist. A species springs up in a limited area; its numbers increase; the food supply in the original area proves inadequate to satisfy the needs of the increasing number of individuals and some of the more hardy members of the race go forth to seek new territory and a new food supply. Their selection of direction followed in this quest for food is a matter of chance, but those going in a direction where they find conditions favorable, survive, and settle there permanently; while those which are less fortunate in their choice of new quarters are either killed off, or

forced to move to still other territory. Such a tendency to dispersal seems logical enough—in fact is absolutely necessitated by food conditions, but now let us turn our attention to the problem of bird migration.

An explanation of the whole problem of bird migration was once attempted upon the same line of reasoning as pertains in the case of non-migratory animals. For example, a bird nesting perhaps in the extreme northern portion of the Temperate Zone of the Northern Hemisphere found conditions in this locality favorable during the summer months, but when winter set in, it was forced to seek new territory where climatic conditions were less rigorous, and the food supply more abundant. Here again the selection or choice of which course to follow, north or south, was a chance matter, but those who chose the former perished; those who chose the latter survived. This same problem, so ran the old theory, presented itself each year, and each generation was compelled to make its own choice or perish. This belief of course is controverted by the fact that most birds leave their breeding ground long before climatic conditions render it necessary, and besides this, that many birds traverse a much longer route in their semi-annual migrations than would be necessary to find suitable climatic conditions. A case in point is the Golden Plover (*Pluvialis dominicus*) which leaves its breeding ground in the Arctic circle in July, the most clement part of the year, and in its migration south, passes over the Temperate and Semi-tropic Zones of the Northern Hemisphere, where favorable conditions exist in order to continue its long flight to Patagonia.

These two facts absolutely preclude the possibility of the suggestion that the question of bird migration is a matter decided by each generation of birds for itself, and nearly all zoologists today hold the belief that a tendency toward migration is inherited by each generation of birds from its forebears as an instinct. This accounts for the fact that birds leave their summer homes long before climatic conditions compel them, "instinctively" knowing that such conditions will come. The fact that birds ignore favorable localities in their migrations, in order to go farther where similar conditions exist, is explicable by the same line of reasoning. The instinct which causes birds to migrate, originated

at a time when the necessary conditions of food supply and climate could not be duplicated in any region nearer to the breeding grounds than that chosen by the species for its winter home. But conditions have changed. Today the Golden Plover could find in our own Southern States conditions identical with those in his winter retreat. Why then does he not shorten his migration route by 1,000 or 1,500 miles and take up his winter abode in the Northern Hemisphere? Will he ever change his habits in this way? This is the question which I wish to attack in this paper.

Before attempting to explain any mode of behavior on the basis of instinct, it is of course necessary for us to procure a definition of the term instinct. In most modern schools of psychology, instinct is defined as an inherited pattern of behavior; the inheritance of a habit once acquired by the ancestors of the animal in question. The definition would do very nicely were it not for the fact that evolutionists and students of heredity have proved to us, without question, that an acquired trait, and one which effects only the body or somatic cells without influencing the germ plasm is incapable of being transmitted to the offspring through heredity. Such an acquired trait a habit obviously is, and hence it becomes impossible to adhere to the definition of an instinct as an inherited habit. A small number of psychologists recognizing the absurdity of the old definition have substituted therefore the following: "An instinct is an inherited or native tendency toward a particular method of behavior." This, while ambiguous and not wholly satisfactory, would do very well as a working definition in the present problem. Now let us look into the matter. Is instinct the only factor in migration?

If instinct is the one and only factor governing bird migration then the Golden Plover which instinctively turns to Argentine and Brazil as its winter home, will never give up this locality in favor of equally favorable and nearer areas. Reason and learning cannot enter at all. The birds' habits are instinctive and will remain fixed until natural conditions require their change.

But is this the case? Let us take as an example the case of two birds and their status in the Chicago Area. This area is situated ideally for a study such as this. At the southwestern tip of Lake Michigan, east but not too far east of the Mississippi

Valley, Chicago offers a wonderful place for the study of accidental visitors and stragglers from the west. Its position on the Great Lakes makes it a logical place to which will be blown birds carried from their normal habitat by storms.

The first bird I shall quote as an example is Harris's Sparrow (*Zonotrichia querula*) a distinctly western species, common in migration west of the Mississippi River. Until very recently the bird, a rare, almost accidental visitant in the Chicago area, was included on our list on the strength of two positive records and two sight records. In the last three years however there have been at least twelve records, two of Mr. H. L. Stoddard at Miller, Indiana; three by Mr. Lyons at Waukegan, Illinois; one by Mr. Sanborn at Beach, Illinois, and six by Mr. G. P. Lewis and myself at Chicago, Illinois. But more than this, the vast majority if not all these records were made in the fall, all between September 20 and October 1 each year. Still further, the bird has not skipped a single one of the last three years, and lastly, several of the specimens, at least one of Mr. Lyons' and my last specimen (taken September 26, 1922) were immature birds. How shall we account for this phenomenon; a bird accidental at Chicago for the last sixty years, suddenly grows regular and commoner in its occurrence. I should like to suggest the following explanation.

The first individuals appearing here, appeared from accidental causes. Perhaps they were blown out of their course by a storm, and found shelter here. Upon finding themselves in new territory, they learned that here, in a place foreign to their normal migration route, conditions were favorable to them. The next year instead of following the traditional path, far to the west, they again chose the short cut upon which they had stumbled the year before, —and they brought their brood with them. This is not instinct, it is *reason*. An objection may be urged against this theory on the ground of coincidence. This would hardly explain how three successive years, the birds have chosen almost exactly the same date, and have chosen exactly the same field in which to put in in their appearance as is the case with the records of Mr. Lewis and myself. The birds chose for the first two years a small field in a rather well populated district of the city, just south of the Jackson Shore Apartments and north of Jackson Park. Apparently

a certain weed upon which the bird feeds was available here. This last year however, the field has been cleared of vegetation, and the bird has sought a new habitat, alighting upon similar fields at the northern extremity of Lincoln Park, a distance of about eleven miles from its former haunts. Another case in point is the Franklin's Gull (*Larus franklinii*). Once before reported from our area, and only twice from the State of Illinois, this bird was noticed on October 15, 1921 on a small sand-bar at the North end of Lincoln Park by Messrs. Lewis and Watson. At the time of discovery there were about ten birds in the flock and hence it would be necessary to assume either that the whole flock was blown in by a storm, or that the discovery marked a rather advanced stage in the Gull's extension of migration route, and that previously straggling individuals had found their way here but had not been noticed. This would be an easy and natural explanation in view of the similarity of this bird to the common *Larus philadelphia*, and the consequent difficulty of distinction. Furthermore the birds were again noticed on the identical sand-bar and on almost identically the same date (October 23, 1922) and the birds acted in a precisely similar manner to last year;—gradually decreasing in numbers until about a week after their first discovery they had all left. In this case also a large proportion of the birds were immatures, the brood perhaps, of those pioneer birds which the year before had either accidentally or purposely selected a migration route equally favorable with the old one; definitely controverted their old "instincts;" and by reason repeated their trip of last year.

There are numerous other examples of birds extending their range into our area, although the two cited constitute most striking examples. The Western Meadowlark (*Sturnella neglecta*), and the Bachman's Sparrow (*Peucea aestivalis bachmanii*) are examples of summer residents where this extension of range has occurred. The former, a distinctly trans-Mississippian form was unknown in the Chicago area until recently when it has established itself firmly in several nesting colonies, one in Chicago Heights, and one near Rockford, Illinois. The latter, a southern form has only recently been found to nest at River Forest, near Chicago where its numbers increase each year.

As permanent residents the Cardinal (*Cardinalis cardinalis*) and the Tufted Titmouse (*Baeolophus bicolor*) may be cited. Both southern forms common in the southern portion of the State, have persistently pushed the boundaries of their range northward, until today the once rare Cardinal is very common if not abundant, and the formerly accidental Tufted Titmouse is a not uncommon permanent resident in restricted parts of the area. These cases however are not examples of changes in migration route, and hence are not so important to our subject as the first mentioned.

Now then to sum up. If we believe that instinct is the only factor influencing bird migration, how can we account for such instances as the above? Shall we not rather say that instinct without doubt is the motivating impulse in the idea of migration in general, but that the change of specific migration route, though brought about by chance, is in many cases preserved and continued by reason of learning, until it again appears in later generations as instinct.

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ARRIVAL OF BIRDS IN RELATION TO SUNSPOTS.

BY RALPH E. DE LURY.

THE time of arrival of a migrating bird at a given place will differ from its noraml time of arrival there by an amount which depends on the numbers of birds, their physiological condition, their food, their enemies and many other factors which vary with the weather. Local weather conditions affect birds with results often too terribly obvious, but the influence of long general pulses and periodic changes in the weather become apparent only from long series of observations of their migrations and numbers. In this connection the records of the weather and of the arrivals of birds kept by Victor Chandon and his family at Montdidier, France, from 1784 to 1869, are extremely interesting. (Annales du Bureau Central Météorologique de France, 1899.) These records are discussed herewith in relation to the 11.5 year

sunspot cycle which has been associated with many terrestrial phenomena.

The Montdidier records give the dates of arrival of the Swallow and the dates of the first song of the Cuckoo and of the Lark, the averages being for the years 1784 to 1869, April 10.0, 18.3, and 15.5 respectively. The records also include measurements of pressure, temperature, rainfall, and the numbers of days of rain snow, hail and thunder. Of these, the rainfall and the number of days of precipitation appear to have a relationship to the sunspot cycle. The rainfall records for the months of March and April are selected as likely to have a more direct relationship to the dates of arrival of the birds in April; and all of these are grouped in sunspot cycles commencing with years of minima of spots,—a table of the latter being also given.

In the following tables the first column contains the years in which sunspots were at minimum, the second column contains the records for those years, the third for the first years after these, the fourth column for the records of the second years after minima, and so on. Means are given at the ends of the columns, and underneath these means smoothed values are given obtained from them by the formula, $0.25\ (a + 2b + c)$, where b is the mean for the column in question and a and c are the means of the columns preceding and following this one.

TABLE I

APRIL DATES OF FIRST SONG OF CUCKOO AT MONTDIDIER, FRANCE.

Year	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9	+10	+11	+12	+13
1784	21	14	18	13	16	20	10	12	12	14	18	10	11	12
1798	12	23	17	20	20	5	25	25	31	27	18	—		
1810	16	11	23	—	37	—	—	—	21	—	13	33	—	
1823	—	—	—	—	—	—	—	37	13	—				
1833	—	—	—	21	—	32	—	18	18	22				
1843	15	15	—	—	21	26	26	11	14	20	12	17	16	
1856	13	18	14	26	26	17	19	10	17	16	10			
1867	15	21	10											
Means	15.3	17.0	16.4	14.8	30.0	25.0	20.0	18.8	18.0	19.8	14.2		16.5	
	16.0	16.3	16.2	19.0	25.0	25.0	21.0	18.9	18.7	18.4	16.2		15.6	

TABLE II

APRIL DATES OF FIRST SONG OF LARK AT MONTDIDIER, FRANCE.

Year	+0	+1	+2	+3	+4	5	+6	+7	+8	+9	+10	+11	+12	+13
1784	19	17	18	6	18	18	15	5	7	16	21	12	16	19
1798	9	23	12	16	20	13	21	15	17	13	14	22		
1810	19	7	20	12	30	20	—	—	10	—	8	20	—	
1823	13	17	19	14	10	12	15	8	9	9				
1833	10	15	19	20	23	12	19	19	19	22				
1843	5	15	8	11	20	16	25	17	14	14	12	13	16	
1856	14	18	14	16	26	18	22	14	15	17	12			
1867	18	21	22											
Means	13.4	16.6	16.5	13.6	21.0	15.6	19.0	13.0	13.0	15.2	13.4		16.9	
	15.1	15.8	15.8	16.2	17.8	17.8	17.0	14.5	13.6	14.2	14.7		15.2	

TABLE III

APRIL DATES OF ARRIVAL OF SWALLOWS AT MONTDIDIER, FRANCE.

Year	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9	+10	+11	+12	+13
1784	–5	11	20	–3	12	17	20	15	9	15	17	8	12	27
1798	5	15	22	18	16	5	18	9	19	14	6	23		
1810	16	3	2	10	11	11	—	—	10	—	2	10	10	
1823	7	15	6	7	5	9	12	–4	8	9				
1833	7	7	2	11	2	9	15	5	17	22				
1843	3	15	3	1	12	3	13	5	7	7	6	6	14	
1856	11	10	8	7	6	10	8	6	6	5	5			
1867	5	7	7											
Means	6.1	10.4	8.8	7.3	9.2	9.2	14.5	6.7	10.9	12.0	7.2		13.8	
	9.1	8.9	8.8	8.2	8.7	10.5	11.1	9.5	9.8	10.5	10.1		10.2	

TABLE IV

MARCH RAINFALL IN MILLIMETERS AT MONTDIDIER, FRANCE.

Year	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9	+10	+11	+12	+13
1784	54	7	54	70	70	48	13	18	52	34	38	37	19	10
1798	9	13	12	45	33	10	31	18	56	18	14	25		
1810	46	4	53	18	31	57	59	59	77	23	30	66	30	
1823	31	45	24	14	68	50	24	15	38	20				
1833	31	7	56	73	21	46	42	4	25	44				
1843	13	46	31	61	17	52	12	18	88	26	21	15	56	
1856	31	18	35	17	33	36	52	20	34	34	34			
1867	57	32	42											
Means	34.0	21.5	38.4	42.6	39.0	42.7	33.3	21.7	52.9	28.4	27.4		32.3	

April Rainfall in Millimeters at Montdidier, France.

Year	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9	+10	+11	+12	+13
1784	39	12	37	52	23	73	70	79	43	10	41	29	11	37
1798	10	66	69	9	27	36	83	60	21	43	17	48		
1810	23	49	66	41	24	59	39	3	51	45	33	46	24	
1823	41	40	40	32	27	56	87	55	44	19				
1833	25	10	29	45	100	23	31	32	44	29				
1843	49	8	31	70	36	83	51	56	75	12	68	21	11	
1856	61	30	33	52	73	7	18	25	11	12	40			
1867	45	48	43											
Means	36.6	32.9	43.5	43.0	44.3	48.1	54.1	44.3	41.3	24.3	39.8		28.4	

March + April Means.

70.6	54.4	81.9	85.6	83.3	90.8	87.4	66.0	94.2	52.7	67.2		60.7	

March + April Means, Smoothed.

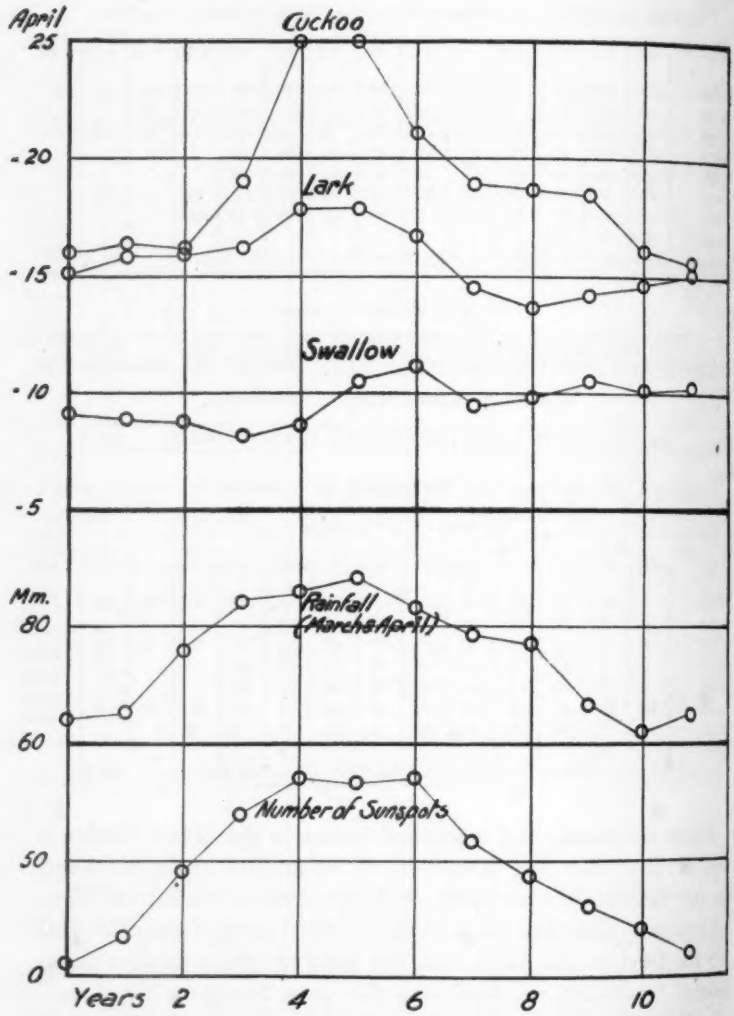
64.1	65.3	76.0	84.1	85.8	88.1	82.9	78.4	76.8	66.7	62.0		64.8	

TABLE V

Sunspot "Numbers".

Year	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9	+10	+11	+12	+13
1784	9	30	80	131	134	115	86	70	58	49	35	24	15	5
1798	4	8	18	37	55	72	70	48	24	12	6	3		
1810	0	1	5	12	20	32	48	41	30	23	15	6	2	
1823	2	8	17	34	52	60	68	64	50	27				
1833	8	13	59	127	141	105	78	68	39	23				
1843	12	20	40	59	102	122	91	69	61	51	35	20	7	
1856	6	22	60	90	96	80	58	47	41	31	14			
1867	7	38	92											
Means	6.0	17.5	46.4	70.0	85.7	83.7	85.6	58.1	43.9	30.9	21.0		10.3	

From the means and smoothed means in the above Tables it appears that there is a periodicity in the arrivals of the birds and in the rainfall in agreement with the sunspot period of about 11.5 years. The chart shows the smoothed mean dates of arrival for the Cuckoo, the Lark, and the Swallow, the smoothed mean rainfall for March + April and the mean Sunspot "Numbers." The Cuckoo exhibits the relationship quite clearly, the Lark to a less degree, while the Swallow appears to be only slightly influenced by the meterological changes traceable to the 11.5 year cycle in the sun. The times of arrival of Cuckoo, Lark and Swallow are 9 days, 3 days and 1 day later at maxima than at minima of sunspots, as appears from the charts. This is shown also by



Records at Montdidier, France, from 1784 - 1869 of Dates of Arrival of Birds, and of Rainfall compared with Sunspot Cycle for the same years.

taking the differences between the mean dates of arrival in years of maxima and minima of Sunspot "Numbers", thus:

Cuckoo,	Max., April	23.3,	and	Min., April	15.3,	Diff.,	8.0	days.		
Lark,	"	"	18.3	"	"	"	13.4	"	5.4	"
Swallow,	"	"	7.7	"	"	"	6.1	"	1.6	"

In considering these differences in arrivals it is, of course, impossible to estimate to what extent, if any, systematic error may be present in the records owing to the progressive change in the weather throughout the sunspot cycle and the effect this may have had on the observers' habits of observation.

It may be reasonably stated that some birds exhibit in their migratory movements relationship to the 11.5 year solar and meteorological variations. Living things like birds and trees may indeed reveal changes in the integrated conditions called the "weather" in a way that the records of meterological elements fail to disclose. Undoubtedly the American records of 30 or 40 years' duration would be exceedingly valuable in this connection. Long series of records of the movements and numbers of birds are likely to be of great value outside of their ornithological bearing.

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A NOTE ON THE ECONOMIC STATUS OF THE BALD EAGLE IN ALASKA.

BY EDWARD D. CRABB.

ALASKA, with her 590,884 square miles, an area which equals that of Great Britain, Ireland, France, and Spain combined, and is about two and one-fourth times as large as the State of Texas; and with a resident population of 63,592 in 1900, which has probably decreased considerably by now, should be a veritable sanctuary for the Bald Eagle. For her mountain tops, cliffs, and craigs are very conspicuous, and high rugged headlands fringe most of her ragged southern and southwestern coasts. These natural fortresses were formerly the homes of thousands of Bald Eagles that reared their young on jutting shelves and pin-

nacles, inaccessible to wild animals, and unmolested by man. The birds fed undisturbed from Mother Ocean's bounteous table on shell-fish, dead fish, and other lawful foods. The numerous streams furnished trout and salmon in their season; while the more level-topped headlands and protected flats supplied an occasional Grouse, Ptarmigan, or white "rabbit" to relieve the monotony of their seaborne diet.

Men in those days would consider nothing smaller, from the standpoint of its monetary value, than a whale, a fur seal, or a gold nugget. But in later years industries began to make their way along the coasts, and of these the foremost in numbers and importance were the salmon canneries. These money-mad concerns soon, by excessive netting in the streams through which the salmon must pass to their spawning grounds as well as in salt water, so seriously reduced the salmon, which is an all-year staple food for man and his dogs, that white settlers as well as Indians complained that their fishwheels, operating ceaselessly in the streams, did not catch enough salmon to supply their winter's dogfeed.

Just why many residents of Alaska as well as sportsmen in the States, should clamor for the lifeblood of Alaska's Eagles was not apparent to the writer during his stay in this Territory. But he noticed that whenever a resident was interrogated about Eagles he invariably concluded his answer by recounting the number of mountain sheep lambs, kids, fawns, domesticated foxes, salmon, and other valuable wild things that Eagles destroy annually. Whether these charges are true or not, it is interesting to the writer to recall that he did not hear a single freindly voice raised in defense of the Eagles while he was in Alaska—and what is more interesting is that only one of the birds' many accusers claimed to have witnessed it commit the serious crimes with which he charged it!

During the last two to three years the voices of eminent wild life conservators in the Eastern States have been lifted in vain against a bounty which was placed on the heads of Eagles of Alaska, in 1918. Among these W. T. Hornady has probably been the most active in pleading for "Old Baldy." He points out that the Bald Eagle is being unjustly exterminated, notwith-

standing the fact that this bird is primarially a fisherman; subsisting chiefly upon salmon which have spawned and died as well as upon other fishes which it captures alive and in no wise interferes with the activities of man.

The writer, during the late spring, summer, and early fall of 1921, observed Bald Eagles at different points along the Alaska coast from its southern extremity around the bay to near the western end of the Alaska Peninsula. Although he saw scores of Eagles in no instance did they appear other than as peaceful fisher-folk. The stomach contents of three Eagles, (*Haliaëëtus leucocephalus alascanus*), which I examined contained chiefly fish bones, as follows:

A female taken at Uyak Bay, on Kodiak Island, May 5, was empty.

Another female taken near King Cove, May 25, contained the feet of a Ptarmigan and a quantity of fish bones.

The stomach of a specimen collected at Pavlof Bay, May 31, contained only fish bones.

Remains of fish were conspicuous at every nest that I visited, which contained or recently had contained young birds. One nest in particular, which contained two Eaglets and was built on the rocky headland, west of Ruby's Lagoon, at Pavlof Bay, showed no evidence of food other than fish having ever been eaten by this family. A major portion of seven "Dollie Varden" trout, ranging in length while alive from twelve to eighteen or twenty inches and still fresh, were lying on the edge of the nest. Other fish bones were plentiful; they were, I supposed for the most part, of this species; for they were comparable in size as well as in general form. Salmon, the usual source of food, had not yet begun running. No remains of either bird or mammal were found, although varying hare, Ptarmigan, many kinds of waterfowl, including flocks of Aleutian Sandpipers, which are rivaled in size only by our flocks of Blackbirds and Crows, were abundant and could easily have been caught by the parents.

After leaving the coast the writer went north from Cordova to the mouth of the Tanana river and up the Yukon to Dawson, and from there back to and up the Forty Mile River, spending three weeks in the Jack Wade and Forty Mile Country, during

July, without seeing a single Eagle! He went then on up the Yukon to old Fort Selkirk, whence he pushed some 455 miles up the Pelley and Macmillan Rivers into the country which is drained by the South Fork of the Macmillan River, in the Yukon Territory, spending twenty-nine days in this vicinity. After returning to Fort Selkirk he took passage up the Yukon to Whitehorse and embarked at Skaguay, October 12, without having seen a dozen Eagles since leaving Cordova, June 20. These observations lead one to believe that Eagles are not sufficiently numerous in the interior of Alaska to do any appreciable damage to the few settlers and the game of that part of the Territory. It is, however, probable that Eagles are more numerous in the interior during the winter and early spring, but why they would leave the open water of the coast for the frozen interior requires an explanation.

A correspondent who has had unusual opportunities to make extensive observations on the Eagles in Alaska, writes that he has observed these birds eating rabbits, Ptarmigan, Grouse, martin, fish, shellfish, and on one occasion, May, 1913, he saw an Eagle kill a pet fawn of the Alaska deer, by striking it in the small of the back.

He states that Mr. Harry Carsteene, Healy, Alaska, Supervisor of the Mount McKinley Park, is convinced that Eagles there kill the young of mountain sheep. This correspondent watched Eagles to find their nests, in the spring and summer of 1919, locating over thirty and killing the young. "There were in most every one (of these thirty nests) duck and bird feathers. In one I found a partly eaten young fox, tail of martin in another . .

I never have examined their stomachs as they are so unsanitary I hate to touch one."

The Territorial Government of Alsaka enacted an unrestricted law, in 1918, offering a bounty of fifty cents a head for Eagles, either the Golden or the Bald-headed species. In this way Alaska lost 5060 Eagles up to January 1, 1920, (W. T. Hornaday, Natural History, Vol. XX, No. 2, pp. 117–120) for which she paid $2530 in bounties. I dare say that more than 1200 Eagles were killed between the southern boundary and the Chilcat Pass during the last calendar year. Bounties, however, are not collected on all of the Eagles that are killed, for most of the sea-faring folk seem to

take keen delight in shooting the birds from boats and usually leave the dead or wounded where they fall. This correspondent wrote that he killed 182 Eagles in 1919 and 327 in 1921, for the bounty—fifty cents each. Although he is convinced that he is really doing humanity a favor by killing as many Eagles as possible, I believe that the sum total of the annual damage done to Alaskans and their interests by Eagles would not cover the annual total of bounties collected for killing these birds.

I do not feel that I have collected a sufficient amount of data on Alaska Eagles to definitely determine their economic status, therefore I hope that some competent, energetic zoologist will spend several months in Alaska studying the economic phases of the Eagle problem and then recommend proper legislation. Since I found Eagles common only along the coasts, I can see no reason for placing a bounty on them throughout the entire territory. Granting that damage by Eagles is actually as great as isolated observers have noted, and as general as the bounty law would suggest, it occurs to me that a strip of country fifty miles wide along the coasts would be sufficient territory in which to apply a bounty law.

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A BREWSTER'S WARBLER AND HIS BROOD.*

BY T. DONALD CARTER AND R. H. HOWLAND.

Plate XXIV

WHILE acting as enumerators during the bird census of the Wyanokie Plateau, in northern New Jersey, on June 4, 1922, the writers discovered a male Brewster's Warbler (*Vermivora leucobronchialis*) mated with a female Golden-winged Warbler (*Vermivora chrysoptera*) and their brood of five young. Wyanokie is situated west of Midvale in north-central Passaic County. The census area of about 3000 acres consists principally of moun-

* Note on heredity of Brewster's Warbler by John T. Nichols.

tainous woodland with lower lying fields and stream fed swamp lands. The census has been taken annually for the Biological Survey since 1916, numerous observers taking part. Both the Blue-winged Warbler (*Vermivora pinus*) and Golden-winged Warbler breed rather commonly in the valleys and lower lying sections where conditions are to their liking. Brewster's Warbler would therefore be reasonably looked for, but until this year had been noted but once since the census-taking was begun.

The first part of the territory canvassed by the writers on June 4 embraced rather high woodland, gradually sloping downward as we followed a stream which finally separated the woodland from a swamp area. As we neared a small clearing in the woods which was within about 100 yards of the brook and swamp, the call-note of a bird directed our attention to a certain tree. Each of us supposedly sighting the same individual and sure of its identification, the words that ensued were unexpected. One insisted that the bird had a yellow breast and was a male Nashville Warbler (*Vermivora ruficapilla*), while the other was equally as emphatic in stating that the breast was white and that the bird was a male Brewster's. Our altercation was short-lived, however, for we found that there were two birds in the same tree and but a few feet apart. The circumstance, which has been reviewed by us with amusement, is mentioned in view of the fact that the Nashville is quite uncommon in this region during the nesting season. But one other individual was reported during the census.

We both turned our attention to the Brewster's which was holding a small green caterpillar. This circumstantial evidence of a family near at hand led us to retire a few feet. We were quiet but a few moments when he flew from the tree to a small butternut in about the center of the open space, and then worked his way down until he had almost reached the ground. After hesitating a moment he dropped into a tangle of briars, short undergrowth and long grass at the foot of the butternut, and was lost to view. He reappeared almost at once and worked his way upward, taking about the same route by which he descended. The absence of the caterpillar was noticed with satisfaction and we hastened to the spot where he had disappeared into the undergrowth. After some careful search we discovered the nest with a

female Golden-winged Warbler brooding. She remained on the nest, her yellow crown being the only conspicuous mark for either bird or nest, until our hands were about a foot from her. She then suddenly slipped off, disclosing five nestlings probably a day old and certainly not more than two days old. The nest, which was subsequently noted carefully and is now in the collection of the American Museum of Natural History, was almost invisible in the concealing tall grass, briars and tangle of vines, and while on the ground directly at the foot of an elm sprout, it was not attached to it. It was composed of bark and leaves, chiefly oak leaves, and a few small twigs. The stems of the leaves did not all point upward. The leaves were bound with coarse strips of bark, the center of the nest being composed of finer strips of bark and tendrils. The cup lining was of horse-hair and a few strips of dried grass. It would seem that the birds must have traveled a considerable distance for the horse-hair. Outside depth of the nest was 4.5 ″; width 4 ″. Inside depth, 3.5 ″; width, 2.5 ″.

After watching the birds awhile, we again resumed the journey. Later in the day, after the census was completed, we returned to the nest with some of the other observers. The birds obligingly allowed close observation but the female flushed from the nest much more quickly than in the morning and was much shier than the male Brewster's.

On the afternoon of June 10, six days after our introduction to this interesting pair and their offspring, Dr. G. Clyde Fisher accompanied us on a return visit to Wyanokie. Armed with cameras, bird bands and a portable bird-trap we, with considerable apprehension as well as anticipation, approached the nest location. During the journey up we had mentioned some of the possibilities of mishap to our brood, and our thought of the dangers which might make our journey without result now seemed almost a prediction, for as we approached the nest a chorus of alarm notes reached our ears. It was evident that our birds were in trouble and we quickened our steps. We first descried a pair of Ovenbirds (*Seiurus aurocapillus*) giving their distress chip. Then our Brewster's appeared and also his mate. A Black-and-White Warbler (*Mniotilta varia*) was also showing concern. Peering into the bushes we quickly perceived the cause of all the commotion, for there, not

more than three feet from the nest lay a four and a half foot mountain blacksnake (*Elaphe obsoletus*). Going immediately to the nest one of us discovered it to be empty. Reassurance to a degree came from another of us who almost at once found a minute olive-green fledgling on the ground about 20 feet from the nest. The little fellow was put into the trap for safe keeping while an attempt was made to take a photograph of the snake. This proved impossible and we tried to capture it, hoping that we might recover whatever of the youngsters it had secured. But the underbrush and carpet of leaves were very thick and the snake eluded us after a strenuous chase.

The fledgling was then banded (No. 48864, A. B. B. A. series), and its plumage noted as follows: Head and crown, uniformly olive-green; back, olive-green; rump, lighter olive-green; tinged with yellow; tail, olive-green, like head and back, the feathers just breaking through sheaths; under tail-coverts, yellow; throat uniformly olive-green; breast, becoming darker olive-green; sides and flanks, whitish with tinge of yellow; belly, like sides; wings, bluish-gray, outer webs slightly margined with olive-green; two distinct and widely separated bright yellow bars.

After replacing it in the trap, which was then set, the Brewster's Warbler entered almost at once but the trap was set too firmly and failed to spring.

A word about the trap might be of interest here, for it is very compact, easy to carry and of great assistance in catching birds for banding. It can be folded from the size $10'' \times 7.5'' \times 7.25''$ when set, to $10'' \times 7.5'' \times 3''$, when folded. The sides fold under the base while the ends fold over the top. It is divided into two compartments. The top of each compartment is provided with a trap-door that is held open by a forked stick. An elastic band or spring is attached to this door, so that when the bird enters and touches the stick, the door falls.

While getting a lighter crutch for the trigger of the trap another fledgling was located hiding under a small bush. Out it scurried with a frightened chip, and was soon made captive and banded (No. 48865). A marked difference in plumage between this and the first one was noted at once. While the upper parts, wings and tail were the same as 48864, the throat and breast were much

lighter olive-green (almost grayish). The breast was somewhat darker than the throat, but was slightly tinged with yellow. Sides and flanks were the same as in 48864 but the belly was yellow.

After this fledgling was placed beside the other, the trap was again set, and the Brewster's in his concern for the welfare of the two youngsters entered the trap almost immediately and was caught and band number 48866 plaed on his left leg. The young were banded on the right leg. We suppose that this was the first Brewster's Warbler to be banded but Dr. Stone has called our attention to the fact that Dr. Winsor M. Tyler banded one in 1913. (Mem. Mus. Comp. Zool., XL No. 6, p. 315). "In the field" the bird had the appearance of having a slightly gray throat, but this proved to be either an optical illusion or due to shadow, for the entire underparts were pure white and the bird was otherwise typical.

After being photographed the Brewster's escaped from our hands as we were attempting to transfer him from one to the other, but he was back in a few minutes with a small green caterpillar, hovering about us as we took more photographs of the two fledglings, and entered the trap again without the slightest hesitation almost immediately after they were again placed in it. He was again photographed. It might be stated that he displayed considerable fighting spirit while in the hand, picking at our fingers liberally but did not squeal. Liberated from the hand for the second time, he flew off but a short distance and was back again almost at once and entered the trap on two more occasions during the afternoon. We admired his utter disregard of consequences in his concern for the welfare of the young, and his desire to administer to their wants was evidenced constantly by the green worms which he kept collecting and carrying. The female while flying down within a few feet of us, and often approaching the trap, was much more wary and at no time was she in much danger of being our prisoner. During our stay the two parents kept up an almost constant chip scolding, which was most continuous when we had the young birds in our hands. The male was not heard to sing. The Black-and-White Warbler paid us three or four visits and a male Golden-winged Warbler also was seen near by, at one time displaying before our female.

The young birds were finally placed in nearby shubbery and the parents were immediately engaged in efforts to lead them away, the male taking the more active part as usual. With green caterpillar in bill, on three or more occasions he inserted his bill into the gaping mouth of a youngster and at once withdrew it, still holding the worm. He would then hop to a near branch and coax the young one to follow. His wishes were finally gratified.

While packing our paraphernalia, we heard the faint chirping of a young bird and upon investigation found it to be another of the brood that had been hiding not ten feet from where we were carrying on operations. The little fellow had kept quiet and under cover for a good two hours. We had not seen the parents make any approach in its direction, but their concern was at once manifested when we took it in hand. It was given band number 48867. The plumage proved to be exactly like that of 48865. The other two youngsters had become accustomed to us, even to the point of one taking a meal worm which was held temptingly before it on the end of a stick, and this fledgling was very lively by contrast.

On the afternoon of June 18, R. H. H. approached the vicinity of the location from a different direction. Arriving at a break in the woods similar to the open patch where the nest was located and about 400 yards south of it, a familiar chip-scold greeted him, and there was the Brewster's with the invariable green caterpillar in his bill. The movements of the Brewster's were followed for nearly an hour, during which time he kept scolding and often approached within a few feet, kept collecting caterpillars and once disappeared into the near underbrush and apparently fed a young bird which was faintly heard but could not be seen. Again an Ovenbird and a Black-and-White Warbler occasionally came near to add a scold or two, but the female Golden-winged Warbler was not in sight. A youngster was finally located, within 15 feet of the observer and almost facing him, perched about five feet from the ground close to the trunk of a small sapling, which was in the midst of a clump of small growth. The Brewster's became more excited and flew very close to the observer, but the young bird kept motionless until a move was made to get a better look at its tail, and then it turned quickly and flew downward into dense

underbrush. While the band on the leg of the Brewster's was easily discerned, the fledgling crouched too low to permit of a band being seen. The plumage of the young bird had undergone considerable change in eight days time. The head and back were dull greenish-gray; wings were bluish-gray, the two bright yellow bars being closer together than on June 10, throat and breast were pale yellowish-green; the belly was seemingly yellow, while the sides were yellowish-white with perhaps a tinge of green.

A prolonged thunder storm, which had been brewing for some time, and which the Brewster's had been preparing for by preening (scolding meanwhile), made further search for young impossible, the Brewster's being lost to sight as soon as the downpour came. Without being able to hear the guiding chip it was impossible to locate him when he disappeared.

On July 8, we carefully searched in the vicinity of the nest location. An inadequate view of a Brewster's was obtained, it being impossible to see a band or tell positively whether the bird was adult or immature. If the adult however, it was apparently in partial molt for the breast was a dirty "moth-eaten" white. There was seemingly some yellow on the underparts. One of the young was discovered, band on right leg being visible, and while undoubtedly a Golden-winged Warbler, a complete description of the state of the plumage could not be obtained in the brief interval that the bird remained in view.

Mr. John T. Nichols furnishes us with the following note on the ancestry of Brewster's Warbler.:—

The hypothesis that Brewster's and Lawrence's Warblers are hybrids between the Golden-winged and Blue-winged Warblers ('Auk' Jan., 1908, p. 86) is now generally accepted. Two divergent plumages in the same cross could be obtained by alternative or 'Mendelian' inheritance in the following manner. Considering only the characters of throat patch and color of underparts; if plain throat and white underparts are 'dominant,' all the first generation of a cross between a Blue-wing and a Golden-wing will have plain throat and white underparts, that is, will be Brewster's. They will, however, carry the throat patch and yellow underparts of their respective parents as 'recessive' characters, to give a definite small proportion of Lawrence's Warblers in ensuing generations.

In a case like the present, if we suppose that the female Golden-winged Warbler was a pure Golden-wing, and the male Brewster's Warbler a first generation cross (the most likely condition), it is possible to prophesy the character and proportions of their offspring. All would inherit white underparts from the female masking any yellow underparts they might get from the male (for in this particular case the *white* inheritance dominates over the *yellow*). Therefore all would in fact have white underparts, and Golden-winged and Brewster's Warblers be the only plumage possibilities. Half would inherit a throat patch from the male (possessed by a first generation Brewster's as a recessive character) and be Golden-wings in plumage. Half would inherit a plain throat from the male (which would mask the throat patch from the female) and be Brewster's in plumage. The young would thus be of two types, half Golden-wings and half Brewster's. Although their underparts would in every case be white, half would inherit the recessive yellow of the underparts from the male and be capable of passing it on to the next generation. That is to say, half of the Brewster's Warblers of this brood would differ from first generation Brewster's in the inability to pass on yellow underparts to succeeding generations, and half of the Golden-wings would differ from pure Golden-wings in the ability to pass on yellow underparts.

Space is lacking to go into the complications in case the parents of this brood were mixed birds, not a pure Golden-wing and a first generation Brewster's as supposed. It will suffice to say that by further banding and observation it may be possible to prove in this locality an exceedingly interesting hypothesis in heredity, or learn matters of interest concerning the crossing of these two species.

The plumages of the young so far as observed here prior to July 8 were nestling plumages, and definite determination of these birds is dependent on their future recovery.

American Museum Nat. Hist., New York.

1. Nest of Brewster's Warbler. (Photo by G. Clyde Fisher.)
2. Male Brewster's Warbler. (Photo by T. D. Carter.)
3. Offspring of Male Brewster's and Female Golden-wing. (Photo by G. C. F.)

NOTES ON A PURPLE MARTIN COLONY.

BY G. FRED ZIEGLER, JR.

TOURISTS passing through the little town of Greencastle, Pennsylvania, which lies in the center of the Cumberland Valley, frequently stop their cars on the public square and get out to observe more carefully the curious dark blue-black birds which dart recklessly hither and thither above the heads of the townspeople or perch confidently on the porches of the numerous boxes which have been put up around the square for their convenience. "What are these birds?," they ask of the nearest passer-by; and the passer-by, whether he be old or young, at once replies with evident pride: "Why, those are the Purple Martins!" And, if he is a true Greencastle citizen, he needs but little encouragement to launch forth into an account of the history and habits of these handsome Swallows which for years have made the town their home and in doing so have conferred upon it a unique distinction.

It is not that Greencastle is the only town where Purple Martin colonies can be found; even Greencastle people will admit that. But when it comes to the matter of tameness—of friendly intimacy between the birds and the citizens—then it is that the inhabitants of the town swell with pride and are willing to back their town against any other in the country. And the astonished tourist can hardly blame them. He has read, perhaps, a little about the Martins. He has learned that, in common with certain other Swallows, they used to make their homes in hollow trees and that they gradually came to accept the hospitality of man to the extent of living in gourds or other artificial hollows provided for them. But he has always regarded them as being shy; the bird-box catalogues, for instance, have had pictures in them showing elaborate boxes set on poles fifteen or twenty feet from the ground, and generally located on an expansive lawn, with "Keep-off-the-Grass" signs probably somewhere near. What wonder, then, that what he sees surprises him! Instead of a diminutive palace, with turrets and porticos of one sort or another, all he sees is a plain rectangular box, with six compartments one above the other,

each with a platform in front to serve as a perch. Instead of being fifteen or twenty feet above the ground, these boxes are hardly eight feet above the ground at their base; and, instead of standing in a protected place—a public park or traffic isle—they are nailed to the telegraph poles around the square, in the very heart of the town's business section, and within easy reach of the people passing by on the pavements. The strange part is that the birds not only show no timidity, but actually seem to revel in the commotion; they not only dart at the brooms of the merchants when the latter are sweeping their pavements in the morning, but they positively refuse to live anywhere except on the main streets, and all efforts to attract them to remoter and quieter portions of the town have so far proved unavailing. Quite naturally, the tamer the Martins become, the prouder become the people of the town; until now it is safe to say that for any man to injure one of those birds deliberately would make him a criminal in the eyes of the community.

Inquiry as to the length of time during which the Martins have made their home in Greencastle brings to light a rather interesting bit of history. The older residents of the town confess that, although in their day people did not pay as much attention to birds of any kind as they do now, nevertheless as children they were interested in the Martins; and the birds were apparently common in the town as far back as 1840 and undoubtedly even in advance of that date. At the time of the Civil War an old two-story tavern, famous for having been visited once by General George Washington and for having been the lodging place of the surveyors Mason and Dixon, used to stand on the southwest corner of the public square, and it was there, according to these older residents, that they remember seeing the first Martin boxes, the boxes having been attached to the building just below the second-story windows. Later there was a box put on the southeast corner of the square, just opposite the hotel, but this box apparently was placed too high, failed to attract any feathered tenants, and was finally taken down after standing unoccupied for almost a decade. The birds were very common, however, throughout the entire period of the War and for ten to fifteen years thereafter.

Then a curious thing happened. One spring the Martins failed to reappear or at least failed to take possession of their summer

quarters. They did not come back the next year or the next. For ten or fifteen years nobody saw them, and a whole generation grew up in ignorance of them. The mystery has never been satisfactorily explained, but the writer of this article quite unexpectedly came across a clue which furnishes a possible solution. About a year ago he was talking with Dr. F. A. Bushey, a native and lifelong resident of the town and veteran of the Civil War, and the doctor was telling of some of his war experiences. The conversation had turned on an English captain with whom the doctor had become associated during the war, and, in the course of the reminiscences that followed, the doctor casually told the following incident:

He was walking one spring morning with his friend the captain through the capitol grounds in Washington City, when the latter suddenly touched him on the arm and called his attention to a small brownish bird, with a black throat-patch, which had flown into a bush in front of them. "That bird," the captain exclaimed, "is an English Sparrow! I never saw one in this country before," The doctor looked at the bird with some interest and then in a few minutes forgot all about it. "But, do you know," continued the doctor, "when I came home to Greencastle that fall to vote—I was practicing in Washington in 1878—the first thing I saw when I stepped off the railroad train was a little flock of those same birds on the station platform; and I remember I told some of the townspeople what they were, and they were mad because they said these birds were *driving away their Purple Martins.*"

Driving away their Purple Martins! Here was a real suggestion. The writer immediately acted upon it and interviewed some of the other elderly people of the town. Well, since they came to think of it, they did remember something about such a thing; they had not thought about it for many years, but there was a time when they had heard people talking about some new bird driving out the Martins. A comparison of dates confirmed the theory Most of the people interviewed had agreed that from about 1880 to 1890 or 1895 there were no Martins in the town, and it was just during that period that the English Sparrows were most rapidly multiplying.

Whatever the cause, the damage had been done, apparently once and for all. The Martins had gone and were not coming back. The people of the town tried various means of coaxing them to return, but without success. After a while most people ceased trying. Two men, however, never gave up the fight. George F. Bloser conducted—and still conducts—a jewelry store on the southwest corner of the square, the corner which in war times had been the headquarters of the Martin colony. In front of his store, erected upon a pole, stood the large wooden watch that was the trade-mark of the profession. One April morning Mr. Bloser was standing in front of his store when a solitary Purple Martin alighted on the top of the wooden watch-stem. Mr. Bloser took one look at the bird and then made a rush for his cellar, coming up in a few minutes with a rudely-constructed bird-box which he then proceeded to fasten to the clock. Ten minutes later his efforts were rewarded when the lone bird—which had a peculiar white marking on its left wing—inspected the box and found it to its liking. The bird disappeared for a day or so, according to the testimony of Mr. Bloser and others, and then came back again accompanied by the flock.

James Shirey, proprietor of a hotel—The Franklin House—which stood on one of the main streets, only a few yards from the square, was another devoted admirer of the Purple Martin; liked to watch it, he said, and liked to hear it sing. Spring after spring he continued to put out boxes, and about 1900, when he remodeled the hotel and made a three-story building of it, he put up boxes on the chimney, at the very top of the building, in the vain hope that he could get back his birds. A year or so later he had a happier idea. He was building a portico over the front entrance of the hotel, a structure just one-story high, the top of which served as a balcony for dwellers on the second floor of the building. Into the wall of this balcony, facing the street and only a few feet above the pavement, he built a Martin box of six compartments, placed horizontally. This time he did not have long to wait for tenants. The Martins must have finally found a house that suited them or have mustered up courage enough to face the Sparrows, and the year following Mr. Bloser's experience saw a second colony established in Greencastle. The business of box-building immedi-

ately revived. H. W. McLaughlin, proprietor of a another hotel on another street, followed Mr. Shirey's lead and succeeded in establishing a colony in front of his hotel. Merchants on the public square erected boxes. Property holders everywhere joined in the effort. From that day to this the town has had its Martins, and almost every year sees new boxes going up. Two years ago the local nature club put up on the square the boxes which are likely first to attract the tourist's attention and which, together with the historic boxes at the two hotels, house practically all of the town's Martin population. Desultory fighting still takes place every spring between the Martins and the English Sparrows, but with their own pluck and the moral support of Greencastle's citizens the Martins seem to have no trouble in evicting any Sparrow that may have squatted in their boxes over the winter.

As migrants the Martins arouse considerable interest. Each year, about the middle of March, a single bird arrives, who seems to act as a scout for all the others—at least the townspeople firmly believe that he does. Beyond a doubt he vanishes again, and in a few days, varying from two to seven or eight, the advance guard of the flock appears. Gradually other stragglers come in. By the second week of April most of the boxes are occupied and the streets resound, of a morning, with cheery whistles, something between a warble and a chuckle. In the latter part of May the eggs are laid, and toward the end of June the half-fledged young birds present themselves to public view and in the following months they learn to fly, amid hair-raising adventures with hungry cats and bad-tempered Sparrows. Early in August the flock shows signs of restlessness, gathering each morning and evening in large numbers on the telephone wires. Some morning the town wakes up to find them gone. They are the first of all the migrants to leave, setting-out by night and generally going all at the same time; although in the fall of 1921, for some unknown reason, a

* Mr. Bloser and William R. Davison, Esq., have assured the writer that for three consecutive years following the coming of the white-marked Martin to the Bloser box they observed the return of the same bird each spring, and that in every instance he arrived alone, to disappear subsequently and return with others of the colony.

single pair* remained in the town until about the twentieth of November, nearly ten weeks after the rest of the flock had gone. No trace was seen of them after that date and it is feared they froze to death.

The following table, taken from the records of the Greencastle Nature Club and its successor The Franklin County (Pa.) Nature Club shows the arrival and a few of the departure dates of the Purple Martin at Greencastle over the period of seven and a half years from 1915 to 1922:

Year	Date When First Bird Was Seen	Departure Date
1915	April 7	Sept. 11
1916	March 31	Sept. 7
1917	March 21	August (?)
1918	March 30	August 20
1919	March 17	August 6
1920	March 26	
1921	March 8	August 10
1922	March 21	

Greencastle, Franklin Co., Pa.

BIRD BANDING AS AN AID TO THE STUDY OF MIGRATION.

BY HARRY C. OBERHOLSER.

MUCH importance attaches to an accurate and thorough knowledge of bird migration. The solution of the many interesting scientific problems presented by this mystery of the bird world is of practical value in such matters as the protection and increase of migratory birds. These problems have long attracted attention, and many ornithologists, among them Palmén in Finland, von Middendorff, Severzoff, and Menzbier in the Russian Empire, Homeyer in Germany, Winge in Denmark, Gätke in Helgoland, Herman in Hungary, Rössler in Croatia, Clarke and Whitlock in Great Britain, and Baird, Cooke, and Brewster in North America, have contributed much to our knowledge of bird migration. The

* This circumstance is the more peculiar because both birds were adults and entirely able to fly.

chief methods by which these men sought to throw light on this subject consisted in observations of the movements of day migrants, the amassing and tabulation of information regarding the times and localities of the appearances and disappearances of birds, and the collection of all possible concomitant data,—biological, meteorological, and geological. Regarding many phases of migration much is to be learned from a tabulation of arrivals and departures and by other similar methods. The discrimination of subspecies often furnishes valuable clues to the origin of migrants. Although we may learn much by these means, most of them have a serious drawback, that they deal with the species as a whole, not with individual birds, and that consequently a considerable part of the conclusions must be reached through negative evidence.

Recent years have seen the development of another method of bird migration study, that of bird banding. This furnishes the means of following the movements of the individual bird, and thus of obtaining absolutely accurate data thereon. It seems to be the long sought for key to many of the difficulties that have hitherto beset the student. It is not, however, sufficient to know the beginning and the end of the migration journey, for we need information regarding the bird while passing between these two points. Therefore, valuable as is the banding of birds in which reliance is placed on a single capture of the bird, the banding of birds by systematic trapping has enormous advantages over the other method.

One of the most important facts to be learned is the direction of migration. This was formerly supposed to be from north to south or vice versa, but Gätke tried to prove a theory of general east and west movement. In so doing he assumed that individuals of some species came to Helgoland from as far east as Lake Baikal, or even the eastern coast of Siberia, which, however, would not be capable of proof without the banding of individual birds. A similar theory of east and west migration, based partly on negative evidence, has been formulated for certain species in North America, but now this is in some cases proved by banding to be actually true.

It was formerly supposed that birds took but a single direction or route when migrating, and exceptions to this rule were explained

by Gätke on his theory of a broad migration front rather than a series of more or less constricted migratory routes. A few cases, such as the Marbled Godwit in North America, which moves both east and west from its breeding ground, and the Thick-billed Sparrow, which migrates southeast, southwest, and northwest from its breeding area, were worked out apparently with accuracy but no one was prepared for the further really astonishing revelations of the variety of routes extending in even opposite directions pursued in many cases by birds of the same species, that bird-banding has disclosed. For instance, European Woodcocks banded near St. Petersburg in Russia have been found to take three entirely different migration routes which lead to three different and widely separated winter quarters.[1] Likewise ducks banded at Great Salt Lake, Utah, were found to have moved both west, north, east, and south during the autumn migration season. Black Ducks banded at Lake Scugog in southern Ontario pursued two distinct migration routes, one down the Mississippi valley, the other down the Atlantic coast, as already shown by Mr. F. C. Lincoln.[2]

Furthermore, the length of the migratory route of individuals is only in a very general way determinable except by bird banding. In fact, Whitlock says:[3] "It may be questioned whether it is possible to prove that any species in central Germany migrates to the southern parts of Africa to winter there."

Nevertheless, examples proving practically this very thing are to be found in the results obtained by systematic banding. For instance, the White Storks that nest west of the Weser River in western Germany migrate to Spain, those that summer east of this river winter in southern Africa.[4] Furthermore, examples of exceptional migration or wandering are found in the Black-headed Gulls banded at Rossitten in northern Germany that were recovered in the island of Barbados, West Indies, and off the State of Vera Cruz, Mexico; and in the Common Tern banded in Maine that was found in the Niger River in western Africa.

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[1] Lucanus, Rätsel des Vogelzuges, 1922, p. 48.
[2] The Auk, XXXIX, 1922, p. 329.
[3] The Migration of Birds, 1897, p. 125.
[4] Schenk, Aquila, XXVIII, 1921, p. 152.

Closely connected with the length of the migration route is the difference in the length of this route followed by individuals of the same species when all travel over practically the same territory. The data afforded by different subspecies[1] of a species have shown that in some cases at least the individuals breeding farthest north winter farthest south, and it has been assumed from this that such is usual. In most species this fact is determinable, however, only by banding; and it is quite possible that this may in other, if not in most cases, turn out not to be so.

Fully as important is the tracing of the exact routes followed by migrating birds; also whether or not this is the same year by year, as well as whether or not it is the same for both adults and young. Here, again, much can be learned by banding that would otherwise be entirely unsuspected. In fact, it is practically impossible, without this means of following the movements of individuals, to work out accurately the trails that birds follow.

Bird banding results to date in both Europe and North America indicate that in determining unknown routes little can be safely inferred from the movements of species already known, and that each must be worked out separately. One of the most interesting developments is the discovery that so many birds, contrary to what has been supposed, follow very circuitous routes in their migration journeys.

The speed at which birds travel while on migration has been the subject of much controversy. Gätke asserted that the Hooded Crow, a bird of ordinarily slow flight, made the migration journey from Helgoland to the eastern coast of England, a distance of some 325 miles, in three hours, a speed of over 100 miles per hour; and that the Northern Blue-throat passed from Egypt to Helgoland in a single night, a distance of about 1600 miles, which would give an average speed of 180 miles per hour. These figures are, of course, obtained by inference, partly from negative evidence, but could be definitely proved or disproved by sufficient banding operations. The question of migration speed involves not only the actual flight velocity of the bird, but also the length of time

[1] In the identification of non-breeding specimens of subspecies that are based on average characters there is, of course, a margin of error, due to such individual variation as overlaps the subspecific differences.

consumed in the entire journey, the actual rate per day and between stops, the rate of advance of the vanguard of the species, that is, the "first arrival," the regularity or irregularity of this, and whether or not the rate increases as the bird passes northward. On these points, through the painstaking work of Professor W. W. Cooke we have some light, but final proof is yet to come through bird banding.

The manner of migration is intimately related to its speed, and includes the determination of how far birds go in continuous migratory flight, particularly over land; how often they stop; whether they go fast and stop seldom, or slow and stop often; how far apart are these stops, and whether or not they are the same on successive migration journeys; whether individuals travel every day, or stop for several days before moving on; how long are these stops; how much time individuals occupy in the total journey between the breeding ground and the winter home; how long they remain on the nesting ground, and how long in winter quarters; whether males, females, and young travel together or separately; which individuals arrive earliest in spring, the summer residents of the locality or migrants on their way to the north; which arrive earliest in autumn, the winter residents or migrants bound farther south; which leave first in the autumn and spring, residents or migrants; and whether adults and young occupy the same or separate winter quarters. On all of these problems bird banding is destined to throw much light.

Another migration subject on which much has been said is the return of adult and young individual birds to the same spot or the immediate vicinity of the previous year's nest to breed. Popular assumption from a few instances has credited birds with a regularity of return that is doubtless beyond the facts. Bird banding experiments show that in certain species at least some individuals do return even to the same spot, but not nearly so often nor as regularly as has been supposed. Whether or not the cause of this irregularity, however, is the well-known high mortality in bird life remains yet to be proved. Frequently a bird occupying a nesting site that was in use during the previous year is found on examination of its band not to be the same individual. Bird-banding operations, notably those of Mr. S. Prentiss Baldwin,

have shown that birds of certain species return with comparative regularity to a restricted winter home, but further investigations are needed definitely to establish this regularity for other species.

The effect of weather, particularly storms, on the migratory movements of birds is undoubtedly considerable, and it is one of the more difficult, but none the less important, questions. Mr. Baldwin's interesting observations on the effect of storms in causing migrant White-throated Sparrows to depart from a migratory way station where they had remained for several days is exceedingly suggestive in this connection, and indicate how much may be learned regarding this from bird banding.

Bird migration "waves," or "rushes" as they are called by British writers, may be intimately related to weather conditions, and we look to bird banding to explain their characteristics, as for instance, whether they are made up of the same individuals over a considerable distance and period of time, or are constantly undergoing changes.

In the case of the extension of range by birds it would be difficult by any other method than bird banding to ascertain by what route the extension takes place, whether by the breeding birds in contiguous territory or by others farther away, and whether performed by adults or by young of the previous year. Likewise in this connection the question of the permanency of migration routes, and whether or not they follow the course originally chosen by birds invading a new territory may also be determined by bird banding work.

From what has been said by the many writers on the subject, it is evident that bird banding, and especially that performed through systematic trapping as developed by Mr. Baldwin, has given a new impetus to the study of bird migration. Judging from what already has been accomplished, it is, we think, safe to predict that many of the baffling problems of bird migration will sooner or latter be solved by this new means of investigation.

Biological Survey, U. S. Dept. of Agriculture, Wash. D. C.

BIRD BANDING AT THOMASVILLE, GA., 1923

BY T. E. MUSSELMAN

Plates XXV–XXVII

ON February 19, 1923, I reached Thomasville, Ga., where I had been invited by Mr. S. P. Baldwin to take charge of the bird banding work which has been carried on under his direction for some years past on his beautiful "Inwood" plantation.

I spent six weeks at the work during which time I banded 610 new birds and handled 73 that had been banded in previous years. These 683 birds "repeated" 3348 times making a total of 4031 individuals taken from the traps.

One of the most striking things that interested me during my work was the large numbers of Chipping Sparrows which seemed to have diseased feet. Many of the birds, particularly the returned birds of former years lacked a nail or even part of the toes; while many of the new birds had black scabs or bleeding feet. This indicated that some very serious trouble was common among the members of this species. I determined at once that I should make an effort to find out more about this, and consequently secured a note book and manufactured a stencil of a bird's foot. Upon capturing an infected Sparrow, I numbered one of my stenciled pictures, and indicated with red and black ink the development of the disease. Results of this experiment were so voluminous that they cannot be dealt with in this article, more than to summarize that 42% of all the Chipping Sparrows captured during my stay in Thomasville were suffering or had suffered from an active infection. Of these 19% showed signs of trouble in previous years that was entirely healed while 23% were in the midst of the disease. Pictures of all stages of the disease were taken, and in the case of Chipping Sparrow No. 37304, I have a pictorial history of its development from the date of its inception until the bird lost every nail or toe on its right foot.

With regard to food I hoped to increase the number of species of birds which I caught by supplementing other seeds and grains than those already in use.

I think one of my best ventures in this line was a purchase of a peck of sunflower seeds which I mixed with the regular chicken-feed, and noticed an immediate increase in the number of Cardinals captured. The millet and sorghum seeds which were added to the bill of fare, did not noticeably increase the number of species, yet I believe that a shelf with chopped suet and cracked hickory seeds maintained for a month before the experiment would attract Chickadees, Titmice, and greater numbers of Nuthatches and Woodpeckers.

Commencing the second day of my stay I fed less food on the outside of the traps and increased the amount on the inside. What bread I placed on the outside was finely crushed, with the result that the Blue Jays and the Thrashers were forced to enter the cage in order to secure the big chunks which they enjoy so much. I believe that the use of fine bread on the outside of the trap will, in future years, increase the number of Warblers caught. However, this year the migration of Myrtle Warblers had already passed, as the spring was extremely early, and seldom did I see any of these birds, which in former years had been captured in good numbers.

One of the greatest surprises that I enjoyed was the catching of practically all the members of a covey of Quail. Unfortunately I did not have large bands during the first several days but luckily the larger bands arrived in a few days and I was able to recapture every Quail a number of times and band them.

As I arose at day-break, I noticed that many Mourning Doves came to the traps to feed, but, it was several days before I was able to catch any of them. Mr. Baldwin sent me a newly designed Woodpecker trap in which I saw possibilities. It had a door at the top and bottom which swung shut when properly placed on the side of a large tree. I noticed that many of the Doves, as they came to feed in the morning, would wander about the outside of the netting which was placed to keep cats and stray dogs from a closer approach to the trap proper. They would circle the netting several times before flying over the top and dropping to the food plot. Accordingly I set up the Woodpecker trap so that in circling the netting on the outside, it would be necessary for the Doves to go around this small hazard or through it. Should the bird touch the trigger, I felt sure that the ends would fall and secure the Dove

for me. I tried the experiment and was successful in catching my first Mourning Dove. However, in later days, I caught other Doves in both the box traps and also in the Sparrow traps, but a Dove is so large that in case of the Sparrow traps, it was unable to force itself into the second room. The trap had to be raised and the bird captured in this way before banding was possible.

Towards the end of my stay, I found that Mr. Baldwin had written to Mr. Wade, the owner of the neighboring plantation, concerning bird banding there, and that his men had baited a field for Doves with the expectation of my going there to trap. I made an early morning visit to the field and imagine my surprise on flushing more than 350 Doves upon my first approach. I immediately designed a large trap and had it placed in the field where this baiting had been done, but it took several days for the birds to become accustomed to the new trap in the midst of the feeding ground, and as I commenced the experiment late I did not have time to catch and band the Doves as I had hoped. However, all preparations are made, and my successor in 1924 will have an opportunity of handling Doves in quantities.

Upon the arrival of the Woodpecker trap I commenced baiting a large pine tree with suet and some cracked English walnuts. I found that for the catching of Red-bellied Woodpeckers, and Nuthatches, this new trap could be successfully employed. It likewise automatically caught several Warblers and I believe it to be a trap of great possibilities.

Many persons fear to commence bird banding because of the danger of hurting the birds. However, any experienced bird enthusiast can do the work successfully by exercising care and following the instructions which have been so minutely worked out. At Thomasville, during the past season, bird fatalities due to direct banding activities were practically nil.

One afternoon a stray cat entered one of the box traps and killed several of the Chipping Sparrows. A Sharp-shinned Hawk attacked the cages many times and killed several birds. In fact, one day I noticed many birds feeding under my net called "BB." A Sharp-shinned Hawk flew against this net causing it to drop and thus captured a number of birds for me. The Hawk was not frightened but viciously tore at the netting until it was able to

sever some of the strings and take away its victim to the neighboring forest. I was able to take care of this bird's existence in the course of a day or two and was never again troubled with Hawks. This trap (Plate XXV, fig. 1) is provided with blocks under the corners of the frame which keep the latter one inch above the ground when it has fallen and thus save escaping birds from injury. A strip of black cloth conceals this opening from the captive birds.

Every six or seven days, apparently, a new pair of Shrikes would locate the trapping experiment. When the Sparrows discovered a Shrike in the neighborhood they would no longer approach the trap, with the result that on several days I had fewer birds than I should normally have had. These Shrikes would sit on a neighboring tree until a number of birds were in the trap, then they would fly down and alight upon the wire of the trap. At the approach of this danger the captive birds would try to escape, and as they put their heads into the squares of the netting, a Shrike would seize the head and tear it off. During the course of my stay in Thomasville, I think I killed no fewer than eight or ten of these vicious birds. They constitute one of the greatest dangers to bird life in the South.

Of all the birds caught this year, 73% returned to the traps a second time. This would probably have been 5% higher if I could exclude all the new birds caught during my last few days stay in Thomasville. These birds did not have time to familiarize themselves with the traps and consequently I did not have a chance to capture them consistently. They did not have time to get the "trap habit."

I had fourteen birds that repeated twenty-seven or more times. Chipping Sparrow, 22849, which was caught in 1922 fifty-four times was caught fifty-one times during 1923.

Cardinal, 55220, was caught twenty-five times in trap D while her mate, 57735, was caught twenty times. Both of these were birds which had been caught in former years, yet careful handling had developed confidence in them, so they did not fear entering the trap whenever hungry.

Probably the most notable lack of fear was illustrated in the Chipping Sparrow, 55020. This bird was caught in net "BB" in front of my house together with twenty-five or thirty other

Chippies. After driving these birds into the collecting cage I re-set the net and repaired to the porch twenty feet away to band the birds I had captured. As soon as I had placed the new band on this bird, I held it in my palm where it lay for several minutes. I then tossed it into the air and it flew directly to the ground twenty feet away and continued feeding under the trap from which I had taken it less than five minutes before. A mere pull of the string would have made it my captive again.

The fact is, that after a bird once gets the "trap habit" it becomes not only a daily visitor, but we often record it several times each day.

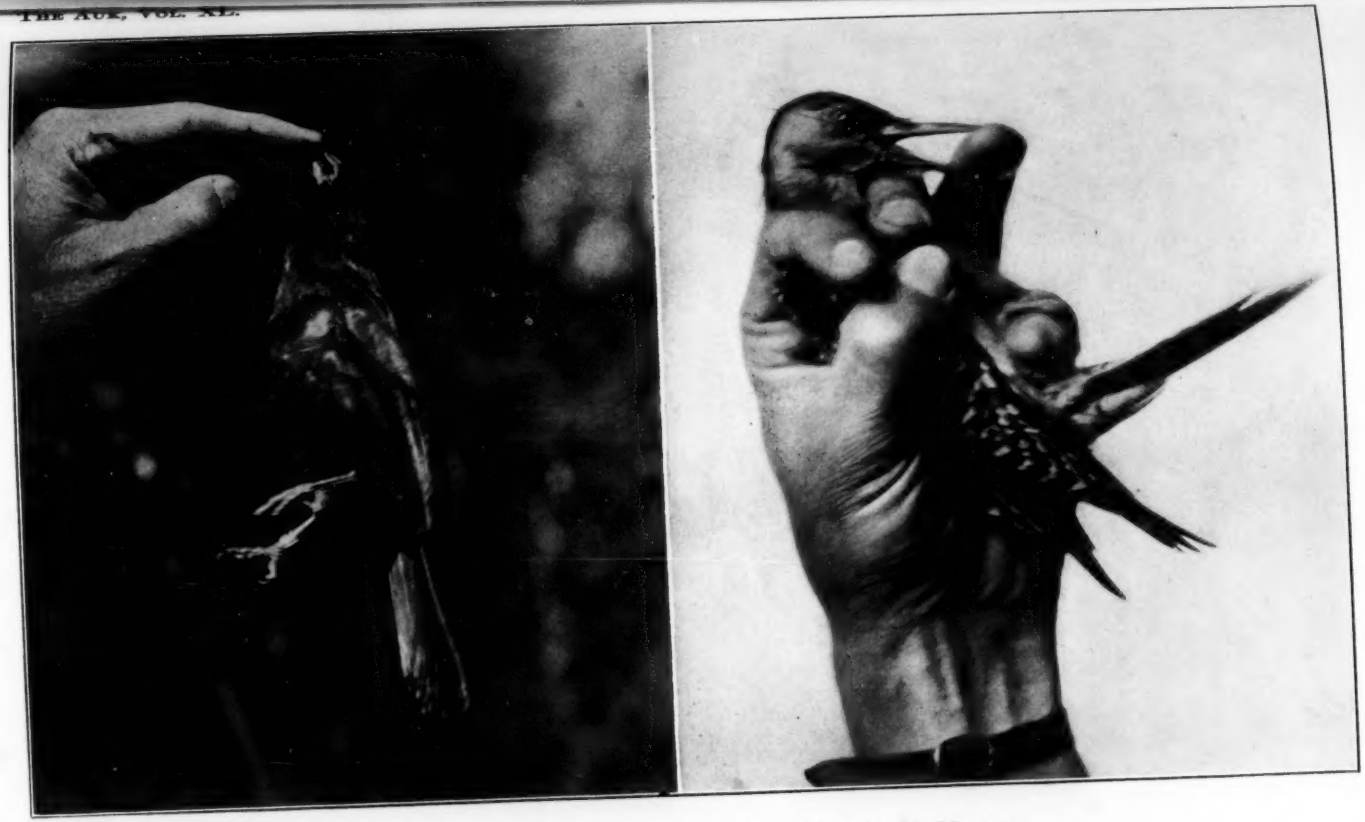
The value of these repeated records lies in the fact that one can study the progress of sickness as so clearly illustrated in the foot infection of the Chipping Sparrows, or, after a bird has had its foot amputated, or, should the tail feathers be pulled out, it gives a fine opportunity for the observer to find out the length of time required for the stump to heal or the feathers to be replaced.

In one case of the foot trouble that I noticed, the infection had developed to the size and shape of a small red cherry. Not alone was the weight tremendous for a foot so small as that of the Chipping Sparrow but the bird had difficulty in getting around because of the clumsy excrescence. I put a needle in an iodine solution and punctured the diseased part with the result that nine drops of blood dropped out on the paper upon which I operated. The swelling went down at once and a black scab formed where the ball of blood had been.

Several days later I soaked this scab in hot water and removed it and found the foot underneath to be fairly well healed. Likewise on the famous Chipping Sparrow, 37304, the infection which eventually practically destroyed the foot extended well on to the tarsus. I removed this scab also and was able to heal the infection before serious damage was done to the foot.

The activities of different birds upon being banded vary. All but the Red-bellied Woodpecker (Plate XXVI, fig. 2) will lie quietly in the hand after banding. The Cardinals pecked viciously at my fingers when caught for the first time, sometimes hanging on by the bill but usually became more or less indifferent to the handling later (Plate XXVI, fig. 1).

1. Net 'BB' Released by a Black Thread. It Caught 51 Birds at one Fall.
2. S. Prentiss Baldwin (right) Examining Chipping Sparrows with Diseased Feet.



1. Cardinal—both Male and Female will Hold on in this Manner.
2. Red-bellied Woodpecker; Showing Proper Method of Holding, the Little Finger as a Perch.

Particularly interesting are the activities of the Red-bellied Woodpeckers and Nuthatches when captured in one of the Government Sparrow traps.

The Woodpeckers became very excited, and they struggled around the entire front room of the trap in their effort to escape. Sometimes they worked along the sides, sometimes they hopped on the bottom. Very often they selected a corner and commenced picking away at the wires in an effort to release themselves. Their size was such that they could not easily pass into the second room. It made it necessary for me to lift the trap and reach in under to secure my captive. No bird that I caught fought more continually than did this one. However, his efforts were of little avail, as his bill did not hurt when he seized my finger or commenced picking at my hand. He struggled during the banding process and did not remain quietly on his back after the process was over as did most birds. He would hang by his feet without flying, provided he had something to pick at.

The moment he found nothing to fight however, he flew away with the characteristic Woodpecker flight, complaining against his capture with his hacking call. On one of the days when the traps were being attacked by a Shrike, a White-breasted Nuthatch chanced to get caught in trap "C." The Shrike immediately settled on the cage. Had the captive been a Chipping Sparrow, its death would have been but a matter of a moment or two; for the Sparrows are prone to force their heads through the wire, and thus become easy prey for the enemy, but the Nuthatch hung with its head downward, far away from the dangerous beak of the attacking bird.

Fortunately I discovered the presence of the trouble maker and killed it before any harm was done. White-throated Sparrows sometimes showed fight while in the cage, and when seized, often turned and tried to bite my fingers. They are weak, however, and I experienced no discomfort from their efforts.

Chipping Sparrows, generally, lie very quietly in the hand. Probably not more than 1% squealed when being handled. I have found that those birds which were recorded by previous observers as "squealers," likewise, showed this trait when captured by me in 1923.

The Towhee was probably the most surprising of all of the birds, as it lay in my hand, it would suddenly kick simultaneously with both feet. The effect was so different from that of most other birds that an amateur would almost certainly have lost his bird. One of the Towhees which I caught most often this year was 41511. He was a brilliant bird and with his mate, 57748, could be found in trap "A" almost any time that I approached it. I caught the female bird 50 times in 40 days—five times one day, four times another day, and three times on six other days. Whenever I released her after having recorded her capture, she would fly several feet then call "To-whee, To-whee," and immediately her mate would answer from the neighboring Azalea bushes, to which she immediately flew. The male bird had one of the strangest characteristics that I have ever noticed among captured birds. Immediately upon being seized, he commenced singing and kept up his song until I released him. I captured this bird 30 times during the period of the experiment.

I had trapped for nearly a week before I caught my first White-throated Sparrows. I heard them about traps A and AA but not until I practically ceased placing bait outside of traps did I begin to make captures. Nowhere but near the mansion house did I see or hear White-throats. I believe that Mr. Baldwin's conclusions that the White-throats at Thomasville are very local in distribution and in their activities are fully warranted.

In fact nearly all of the birds captured at this banding station showed a tendency to feed chiefly in one locality. For example Chipping Sparrow, 37050, was captured 39 times. Of these captures 32 were made at D, six at C, which was not more than 150 paces away, and one at Box 1 which was located about halfway between these other two situations, but farther to the south. This is the most notable case of local feeding that I recall.

I was almost always certain of finding one or both of the Cardinals, 55220 and 57735, upon approaching trap D, provided I had used a bountiful supply of sunflower seed. Likewise the two Towhees which I caught most often, 57748 and 41511, were continually caught in trap A, although I sometimes found they had strayed around the main house to trap "AA." Twice in the course of the trapping experiences, I captured the male bird,

41511 over at trap D, which was 3 blocks away. Yet, never did I catch him at any of the intermediate traps. What caused him to leave his native brush on these occasions I cannot say unless it was the presence of another male which sometimes seemed to have the better of him and he might have gone on a wooing expedition.

Wishing to determine how local was the distribution of the birds that I was catching, I took trap "AA" from the front of the plantation house and carried it across the fields fully half a mile beyond trap "D," which had been my last trap. My daily catches at this trap were enormous yet scarcely any of the birds were new birds. Nearly all of them were Chipping Sparrows ranging in number from 37026 to 37150, all of which had been banded during the first week of my experiment and which evidently had moved, either because of the desire for different food, or because of the flocking instinct preparatory to the northward migration. I kept this trap in operation just a week. Few of the birds, caught in it ever returned to the principal string of traps, and evidently moved onward to their nesting sites farther north.

I was not content, however, with the distance at which my trap had been placed, so I took one of the very effective net traps over to the Wade plantation about two miles directly away from Inwood plantation and beyond the trap "F." I made but one capture of some 15 or 20 birds and there was not a banded bird in the group so that I feel that the Sparrows which lived upon the food at Inwood probably went into the nearest woods for a change of diet before starting on their northward travels, but did not move generally into other forests about Thomasville.

Had I earlier appreciated the opportunity of capturing Chipping Sparrows at the Wade plantation, I should have secured numbers of them and banded them. I should have brought numbers of these banded birds from that plantation to ours to see whether they would return to the site at which they had originally been captured, or whether they would join the ranks of the local birds. These are problems that can be worked out and undoubtedly will be worked out at Thomasville, within the next few years.

Had it not been for dogs, cats and Shrikes, the experiment this year would have been almost without a fatality. Yet these

are things over which man has no control and the total birds wounded and killed was probably not greater than it would have been were banding not carried on.

In all I captured only five birds which had suffered the loss of a foot. I can not find records showing that any of these had been operated on by former agents at the Inwood plantation. I believe the steel trap is accountable for many such accidents. These birds learn to approach the food situations without fear. In the course of their northern travels, some of them are almost sure to meet with a rat trap, set for some of these vermin and as the steel jaws close they amputate the leg swiftly and surely.

I found it necessary to remove the lower half of the leg of female Cardinal, 46048. The leg became crushed in some way and I was unable to place a splint which the bird could not remove. The leg was amputated on March 21, and it was healed by the 26th. On the 29th I caught the bird at trap G where it came to feed. She sometimes sank to the ground and rested on her body while eating but seemed not greatly inconvenienced and the fact that I caught her three times on the 29th shows that she had little fear of the traps, even after her accident.

The bob-legged Brown Thrasher, 53085, mentioned in the reports of former years was a very cautious visitor, yet I was able to catch it a number of times in my net trap "BB".

The smallest bird that I captured was a Ruby-crowned Kinglet which carries the band 37480. This bird was so small that while showing it to several friends, it deftly crawled through the three quarter inch mesh of the cage and escaped. That its capture was not a mere accident was proved when I captured it a second time. Whether it was attracted by the millet seed which I was feeding, or perhaps, by the bread crumbs, I do not know, but certainly one or the other must have taken it to the trap.

Of all the traps that I used, I feel that in point of number of new birds and repeats, the net trap "BB" is superior to all of those that I used.

Each morning shortly after the break of day tremendous flocks of Chipping Sparrows gathered under this net. They entered it with less apprehension than they did any of the other types. On one occasion I caught fifty-one birds at one fall. There was

1. Loggerhead Shrike the Pirate of Birdland.
2. Infected Foot of Chipping Sparrow.
3. Aluminum Bands. U. S. Biological Survey.

scarcely a day that it did not give me two or three catches, totaling from 15 to 25. Many times birds were included in such a catch which I had not recorded in any other trap for several weeks.

The following summary will illustrate the number of new and return birds, which I captured and banded.

Not only has my interest in bird study been stimulated, but I likewise have seen the great possibilities which bird banding opens to the scientific ornithologist when the entire country becomes thoroughly organized with banding stations.

I feel that we owe a great deal to Mr. Baldwin for maintaining the remarkable experiment at Thomasville and I hope that each year the observer who is fortunate enough to be selected to carry on the operations there will improve on the work. I can merely conclude with the suggestion that if any reader of 'The Auk' wishes to increase his interest and knowledge of birds, get one or two traps and start banding. Once he has started banding he will never stop, and science and the birds as well as he will be the beneficiaries.*

BIRDS CAUGHT AT THOMASVILLE, GA., IN 1923.

NEW BIRDS.

Chipping Sparrow	519	Yellow Palm Warbler	1
Quail	13	Palm Warbler	3
Brown Thrasher	5	Mourning Dove	6
Mockingbird	2	Florida Blue Jay	5
Loggerhead Shrike	7	Blue Jay	1
Red-bellied Woodpecker	2	Myrtle Warbler	2
White-eyed Towhee	4	White-breasted Nuthatch	2
Red-eyed Towhee	2	Field Sparrow	2
Pine Warbler	5	White-throated Sparrow	6
Cardinal	20	Ruby-crowned Kinglet	1
Song Sparrow	2		
			610

* Mr. Musselman might well have mentioned the fact that he did not take this year the old Brown Thrasher 19247. Readers may recall that 19247 was banded in 1915 and taken last year (1922) by Mr. Talbot, the bird being then at least eight years old. Once before, in 1921, it was not taken and we then supposed it had died; so let us hope it may yet be alive and will be taken in 1924.

S. P. Baldwin.

RETURN RECORDS

Chipping Sparrow	44	Cardinal	8
Brown Thrasher	4	Palm Warbler	1
Mockingbird	1	Florida Blue Jay	1
Red-bellied Woodpecker	3	Blue Jay	6
White-eyed Towhee	1	White-throated Sparrow	4
			73

New Birds	610
Return Records	73
Repeats	3348
Total	4031

Quincy, Illinois.

NOTES ON THE NESTING BIRDS OF NORTHERN SANTA FE COUNTY, NEW MEXICO.

BY J. K. JENSEN.

Plates XXVIII–XXIX

IT has been my good fortune to spend the five years 1918–1922 with the birds of northern Santa Fé County, New Mexico. Although my leisure for bird work has been very limited, I have spent some time in the field and succeeded in locating the nests of more than 100 species.

As the country hereabout is for the most part exceedingly rough, with only very few second and third class roads leading through, and the largest part only accessible by walking or with pack train, it is very difficult to thoroughly explore, and I am certain that a great many nesting species have escaped my notice.

The country examined forms roughly a square of some, 1,600 square miles. With Santa Fé as the center, I have taken in a good 20 miles in every direction.

Santa Fé is located at the foot of the Sangre de Cristo Mountains at an altitude of 7,000 feet. The southern part of my range has been the Indian Pueblos of Santo Domingo and Cochiti near the foot of La Bajada Hill, at an altitude of about 5,500 feet; the

northernmost, the San Juan Indian Pueblo, thirty-five miles north of Santa Fé; while the highest point reached is Lake Peak northeast of Santa Fé, altitude 12,600 feet and in part above timberline. From Santa Fé to the top of Lake Peak the country is one continuous round of mountains and canyons. Through the Santa Fé Canyon leads the only road for a distance of about ten miles, passable for automobiles.

Southeast of Santa Fé the country becomes more level, but in places deep box canyons, like Apache Canyon, cut through. South and west the country seems level or rolling but sloping toward the south, here and there cut with narrow valleys with rimrock on one or both sides. At La Bajada the country makes an abrupt drop of about 900 feet.

South, east and west of Santa Fé, the country is covered mostly with a sparse growth of piñon or nut pine (*Pinus edulis,*) juniper (*Juniperus utahensis*) and cacti; while north of Santa Fé the Sangre de Cristo Mountains are covered with timber, mostly yellow pine (*Pinus scopulorum*) and Douglas spruce (*Pseudotsuga mucronata*), and at the higher altitudes with blue spruce (*Picea parryana*). Along the river courses are small groves of narrow-leaved cottonwood (*Pupulus angustifolia*), alder (*Alnus tenuifolia*) and several species of willows. Burnt over areas are usually covered with aspens (*Populus tremuloides*).

In the piñon covered areas, which I shall henceforth refer to as the "Piñon Flats," snow usually stays only a few days, while on the higher mountains snow may be found from September 1 to late in July, and in patches the whole year round.

In the mountains the larger carnivorous quadrupeds are still to be found in some numbers, and often on my rambles I have come across tracks of bear, puma, timber wolf and bobcat; while on the Piñon Flats the coyote is common.

Over the entire district are found many odd geological formations of which I shall mention the "Crater," because this particular place often serves as a nesting place for some of the larger birds. It is a hole, probably an old crater or gas vent, in almost level ground 15 miles southwest of Santa Fé. It has a diameter of about 25 feet, growing somewhat larger toward the bottom, and a depth of from 300 to 400 feet.

The birds included in the following list have either been found nesting or been seen during the nesting season, so they are actually all summer residents of northern Santa Fé County:

1. **Colymbus nigricollis californicus.** EARED GREBE.—During April and May a flock of from 50 to 100 of these birds may be seen at the upper reservoir in the Santa Fé Canyon. About June 1, they leave for their nesting places. During 1921 one pair remained and they could be seen together constantly until July 1, after which date only the male was seen. The only possible nesting place in the reservior is a small island covered with tall grasses. I had no way of examining this. During the latter half of July and all of August I was absent from Santa Fé, so I am unable to state whether or not there were any young raised. At this writing, July 9, 1922, two pairs seem to be making their homes at the same place.

2. **Oxyechus vociferus.** KILLDEER.—These birds are abundant wherever a little moist ground can be found. Often discovered nesting along the streams well up into the mountains, at least, to an altitude of about 7500 feet. Average set 4 (3). Fresh eggs, April 20 to May 10. These birds are much more noisy before incubation commences and after the young are hatched, than during the period of incubation.

3 **Podasocys montanus.** MOUNTAIN PLOVER.—A few pairs seem to be nesting on the mesa between Domingo and Pena Blanca.

4. **Callipepla squamata squamata.** SCALED QUAIL.—A common bird, nesting on the Piñon Flats. Sets usually 10 to 15 eggs. Fresh sets May 15 to June 10.

On May 18, 1918, after dark, some Indian boys brought four eggs of the Scaled Quail, which they told me they had found in a one-gallon tin can lying in a shallow arroyo about a mile west of the Government Indian School. I was anxious to secure a set of eggs for my collection, so I went with the boys to the place and found a well built nest of straw and weeds in an oil can. I returned the eggs to the nest, and a week later, May 25, it contained a set of ten eggs.

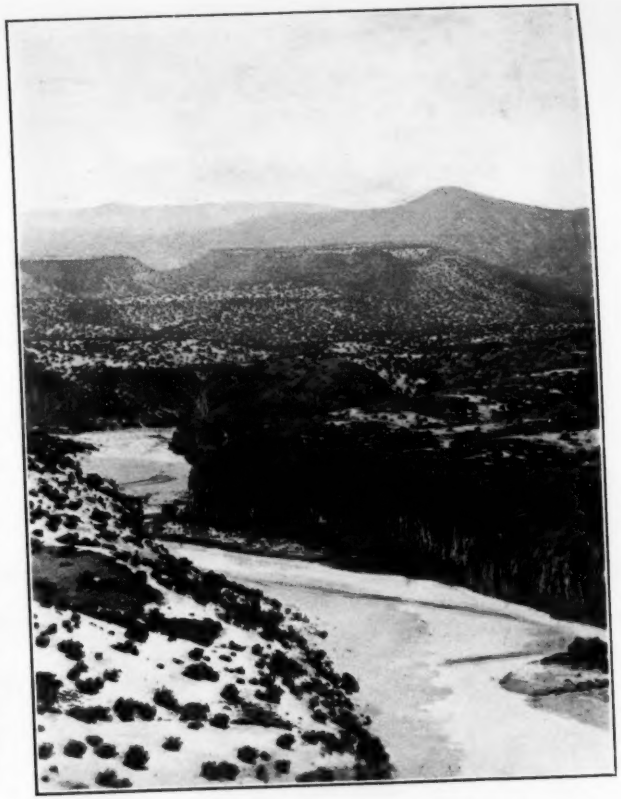
5. **Lophortyx californica californica.** CALIFORNIA QUAIL.—A common game bird nesting on the Piñon Flats. Sets 10 to 15. Fresh eggs May 1 to June 15.

6. **Dendragapus obscurus obscurus.** DUSKY GROUSE.—A closed season of several years duration has been favorable for these birds, and they have increased considerably in numbers and are now quite common in the mountains from 9,500 feet to timberline. I have learned from sheep herders that nests containing from 7 to 14 eggs have been found.

A female, shot at Bear Head in the Jemes Mountains November 21, 1921, had been feeding entirely upon the needles of the Douglas fir.

7. **Lagopus leucurus leucurus.** WHITE-TAILED PTARMIGAN.—Few are left on the higher peaks of the Sangre de Cristo Mountains.

8. **Meleagris gallopavo merriami.** MERRIAM'S TURKEY.—Locally these birds are quite common, nesting well up in the mountains during the



1. Sandstone Cliffs near La Bajada Hill, N. M. 2. White Rock Canyon, Rio Grande. Typical Piñon Pine Country.

SANGRE DE CRISTO MTS., N. M.
1. Lake Peak (12600 ft.). 2. Aspens in Sante Fé Canyon.

latter part of May. Sheep herders and ranchers tell me about nests with as many as eighteen eggs.

October 23, 1920, I shot two birds, and the next day another. All were young, and weighed from eight to ten pounds each. October 23, 1921, I met a flock of twelve birds in the Santa Fé Canyon, less than six miles from the city.

The feathers of the Wild Turkey are highly prized by the Indians, who use them in their ceremonial dances and as offerings (prayersticks).

9. **Columba fasciata fasciata.** BAND-TAILED PIGEON.—These are rare in the Sangre de Cristo range; they are more common in the Jemes Mountains. My only nesting record is April 23, 1922, on which date I found a nest, with one well incubated egg, sixteen miles northeast of Santa Fe. The nest was placed in a slender spruce sixteen feet up and four feet out on a limb. Although the tree was shaking and bending I managed to climb to the nest. The female stayed on until I almost touched her. The altitude at this point was 10,500 feet, and at the time well-above the snow line.

10. **Zenaidura macroura marginella.** WESTERN MOURNING DOVE.—Abundant, nesting on the Piñon Flats and up to 8,000 feet in the yellow pine.

11. **Cathartes aura septentrionalis.** TURKEY VULTURE.—Common. May 27, 1922, I saw a pair of these birds about eighteen miles west of Santa Fé. They acted as if they might be nesting in a large pile of boulders broken off from the rimrock.

12. **Accipiter velox.** SHARP-SHINNED HAWK.—On two occasions I have met this Hawk in the Santa Fé Canyon during the nesting season.

13. **Accipiter cooperi.** COOPER'S HAWK.—These birds are common in the early spring, and a few remain during the nesting season.

14. **Buteo borealis calurus.** WESTERN RED-TAIL.—Common. Nesting at least up to 9,000 feet. They nest both on trees and in pockets on precipitous cliffs. For several years a pair nested on a shelf in the "Crater." May 31, 1920, I found a nest in a large yellow pine. The nest was up about 40 feet and contained three heavily incubated eggs. April 2, 1921, I found an occupied nest in Canyon el Diablo near Buckman placed in a pocket on a perpendicular cliff about 250 feet up. May 27, 1922 I located a nest with two downy young on the rimrock eighteen miles west of Santa Fé. Most of the nests found are in inaccessible places on the rimrock.

The Pueblo Indians use the red tail feathers in their ceremonial dances.

15. **Aquila chrysaëtos.** GOLDEN EAGLE.—Not uncommon as a nesting bird, but most of the nests are located so as to be inaccessible during the early part of the nesting season. April 11, 1920, I located a nest in a pocket on a 150 foot cliff in the Apache Canyon. The nest then contained two downy young. Late in May, I again visited the nest and found the young nearly full grown. February 27, 1921, I again went to the nest and collected a set of two nearly fresh eggs. On neither occasion did the

Eagles show fight, but left at my approach, and while I was actually standing in the nest, they never came nearer than fifty feet.

Other nesting places may be found near La Bajada Hill; in the Sangre de Cristo Mountains fifteen miles northeast of Santa Fé; in White Rock Canyon; at the head of Rito de los Frijoles; near St. Peter's Dome; and near Jemes Pueblo.

The Indians use a large number of Eagle feathers for head dresses. For the sake of these feathers, Eagles are held in captivity in several Indian pueblos, among which are Sia and Jemes. The Pueblo Indians, as well as the Navajos, have their "Eagle catchers"—men trained to capture the full grown birds. My Indian friends tell me that no traps are used, as these would bruise the Eagles' legs. Their method of catching them is as follows: A hole about three feet square and from five to six feet deep is dug in the ground near a tree. The "catcher" then places himself in the pit, which later is covered with limbs and turf, except for a small opening just large enough to slip the hand through. A dead rabbit is placed on top as bait, with a tame Eagle as decoy. If a soaring Eagle spies the tame Eagle, it alights in the tree, and after examining the surroundings for some time, it darts for the rabbit. This is the concealed man's opportunity. He reaches out and catches the Eagle by the legs, and pulls it down into the hole which is too narrow for the Eagle to fight in.

16 **Falco mexicanus.** PRAIRIE FALCON.—Not uncommon and can be found nesting in pockets in the rim-rock. In May, 1919, a pair acted as if they were nesting in one of the old cliff-dweller caves on the mesa above Buckman, and in April 1921 a pair was nesting near La Bajada Hill.

17. **Falco peregrinus anatum.** DUCK HAWK.—During May, 1921, I saw a male several times hovering in the air near one of the tall trestles on the Denver & Rio Grande Western Railway one mile west of Santa Fé.

18. **Falco sparverius phalaena.** DESERT SPARROW HAWK.—Abundant. Nesting in hollow trees, cornices of buildings, old abode walls and nesting boxes, but most frequent in holes in cut banks. Average set 4 (3–5). Fresh sets May 1 to June 15.

19. **Otus asio cinereus.** MEXICAN SCREECH OWL.—May 15, 1921, I found a nest of this species in a Flicker hole in a large cottonwood on the river bank in Santa Fé. It contained four nearly full grown young.

20. **Otus flammeolus.** FLAMMULATED SCREECH OWL.—A pair has for the last five years been nesting at the Indian School campus. I have not been able to locate the nesting place, which is probably in one of the buildings.

September, 1918, I caught one of these little Owls while it was sleeping in a peach tree in the school orchard.

21. **Bubo virginianus pallescens.** WESTERN HORNED OWL.—Common. Nesting in cavities in large cottonwood trees, but more often in cut banks. A pair is nesting regularly in a cut on the Santa Fe-Lamy Railway near Arroyo Hondo. The incubating bird is only about six feet

from the passing trains. Average sets, two, sometimes three eggs. Fresh sets March 10–April 10.

22. **Speotyto cunicularia hypogaea.** BURROWING OWL.—Fairly common. Found a small colony near Santa Cruz,, where from prairie dog holes I took two sets of six and seven eggs respectively on May 9, 1920. A few scattered pairs are nesting on the Piñon Flats.

23. **Glaucidium gnoma gnoma.** PYGMY OWL.—I have never found the home of the Pygmy, but they are supposed to nest quite commonly in Flicker holes near Lamy and Glorieta.

24. **Geococcyx californianus.** ROAD-RUNNER.—Quite common. My friend Mr. John S. R. Hammitt collected a set of four fresh eggs from a nest in a willow two miles southwest of Santa Fé.

December, 1918, I saw a pair of Road-runners feeding with the chickens on a ranch near Santa Fé. The owner of the ranch told me that they came regularly for a "hand out" and often went to roost in the poultry house.

25. **Coccyzus americanus occidentalis.** CALIFORNIA CUCKOO.—Rare in this locality. June 24, 1918, I saw one at San Juan Pueblo. June 18, 1919, an Indian girl brought me a wounded Cuckoo she had found on the Indian School campus. June 5, 1922, I heard one in the Indian School orchard.

26. **Ceryle alcyon alcyon.** BELTED KINGFISHER.—Not uncommon, probably nesting in the banks of the Rio Grande.

27. **Dryobtes villosus monticola.** ROCKY MOUNTAIN HAIRY WOODPECKER.—Quite common in the Sangre de Cristo Mountains, from 8,000 to 11,000 feet. June 21, 1920, I found a nest thirty feet up in a large quaking aspen. This tree stands on the edge of a place where an avalanche has plowed its way down through the timber on the mountain side, depositing trees and rocks in a great heap for hundreds of feet around the tree. The nest contained young, and judging from the noise they made, were quite well developed. The parent birds were very noisy.

May 22, 1921, I made my way through four feet of snow to the same tree. A new nest had been made, and the female flew off when I was about 150 feet away. I cut into the nest and found a set of four eggs on which incubation had just commenced. The altitude at this point is 11,000 feet. May 26, 1922, I found a nest with young about seventy-five feet up in an aspen. This was in the Santa Fé Canyon at an altitude of 8,000 feet.

28. **Sphyrapicus varius nuchalis** RED-NAPED SAPSUCKER.—Common between 8,000 and 9,000 feet. Nesting in aspens ten to twenty-five feet up. Average set four (3–5). Fresh sets June 1–15.

In the winter these birds quite often visit the Indian School campus.

29. **Sphyrapicus thyroideus.** WILLIAMSON'S SAPSUCKER.—Not very common. June 1922, a pair nested in a pine stump in Santa Fé Canyon. Altitude about 9,500 feet. It is possible to identify this Sapsucker from the way he pounds a dead limb, at least during the nesting season, because

he strikes two blows, and after a short pause four blows. This is repeated over and over.

30. **Melanerpes erythrocephalus.** RED-HEADED WOODPECKER.—During 1919 and 1920, a pair nested in a hole in a telephone pole, near the crossing of the Santa Fe-Lamy Railway and Cerrillos Street in Santa Fe. During 1921, a pair of Sparrow Hawks took possession, but this spring, 1922, the Woodpeckers were back again.

31. **Asyndesmus lewisi.** LEWIS'S WOODPECKER.—Abundant in the fall. Fairly common during spring and summer. August 9, 1919 near Pojaque I saw one feeding its young. May 10, 1922, I saw a male in a cottonwood 10 miles east of Santa Fe. I could not, however, locate any nest.

32. **Colaptes cafer collaris.** RED-SHAFTED FLICKER —Very common. I have found them nesting all over the district covered and from 5,500 to 12,500 feet. Average set, seven eggs (5–8). Fresh sets May 20 –July 1.

February 1, 1922, a Flicker was seen hanging to a wire screen on a sleeping porch at the U. S. Indian School, eating berries of the Boston Ivy. Temperature 2 above zero.

33. **Phalaenoptilus nuttalli nuttalli.** POOR-WILL.—Rare. I have seen a few birds on the Piñon Flats, and August 21, 1920 I shot one of a pair two miles west of the Indian School.

34. **Chordeiles virginianus henryi.** WESTERN NIGHTHAWK.—Abundant. Nesting over the Piñon flats, during the first half of June. June 20, 1920, and June 26, 1922, I saw and heard Night Hawks flying over the summit of Lake Peak in the Sangre de Cristo Mountains. Altitude 12,600 feet.

35. **Aeronautes melanoleucus.** WHITE-THROATED SWIFT.—Common. During 1920 and 1921, quite a colony was nesting on the 300 foot perpendicular cliffs in Canyon el Diablo near Buckman. June 1921, I found a good sized colony in the rimrock eighteen miles west of Santa Fe, but in 1922 only two pairs were left in the place last mentioned. May 27, I let an Indian boy down over the 100-foot cliff to try to get a nest, but the top of the cliff overhung the nests, so when the boy came down on a level with the nests he was about fifteen feet from the cliff, and was unable to get close enough to collect a set of eggs.

36. **Archilochus colubris.** RUBY-THROATED HUMMINGBIRD.—I have seen a few birds here.

37. **Selasphorus platycercus.** BROAD-TAILED HUMMINGBIRD.—Common. June 29, 1919, I took a set of two eggs in the Santa Fe Canyon, at an altitude of 8,000 feet. The nest was placed in a low shrub overhanging the stream and only about eighteen inches above the water. Two pairs were nesting on the Indian School campus in 1921, and again in 1922.

June 26, a pair of birds spent a good bit of time in a small dead spruce near the cabin on Lake Peak. Altitude 12,000 feet.

August 5, 1918, I counted 119 Humming birds resting on a telephone wire—this during a five-mile auto trip.

38. **Tyrannus vociferans.** CASSIN'S KINGBIRD.—Very common. Nesting up to 7,500 feet. It usually makes its home from ten to fifty feet up in some shade tree, but the nests may also be found in Piñon pines. Average set four. Fresh sets June 1–15.

39. **Myiarchus cinerascens cinerascens.** ASH-THROATED FLYCATCHER.—A few pairs are nesting in Bluebird boxes placed on piñon pines three to five feet up. I have seen several nests destroyed by pack-rats and chipmunks. Average set, four. Fresh sets, June 1–15.

40. **Sayornis sayus.** SAY'S PHOEBE.—Very common. Nesting to 7,500 feet. The nests are often placed in buildings, under bridges, but most commonly in a pocket in the steep bank of an arroyo. Average set, four (3–6). Fresh sets May 1–June 15. Very few eggs are marked with brown spots.

41. **Myiochanes richardsoni richardsoni.** WESTERN WOOD PEWEE.—Common near water up to 8,000 feet altitude. Average set, three (1–4). Fresh sets June 15–July 1.

42. **Empidonax difficilis difficilis.** WESTERN FLYCATCHER.—Very common near water from 7,500 to 10,000 feet. I have found nests placed on the sheer face of a ledge; in a cut bank; on a stump and in a tree cavity. Nearly always four (3–5) eggs make an average set. Fresh sets June 15–July 1.

43. **Empidonax trailli trailli.** TRAIL'S FLYCATCHER.—No nesting record. A pair spent the summers of 1920 and 1921 in the Santa Fe Canyon near the Elk's Cabin. Altitude a little over 8,000 feet.

44. **Empidonax wrighti.** WRIGHT'S FLYCATCHER.—Not common. June 6, 1922, I found on a very dry hillside far from water, ten miles southeast of Santa Fe, a nest with three well incubated eggs. This was placed on one of the lower limbs of a piñon pine three feet up. Altitude 7,500 feet.

45. **Otocoris alpestris leucolaema.** DESERT HORNED LARK.—Common all through the Piñon Flats. Average sets three to four eggs. Fresh sets April 1–June 1.

46. **Pica pica hudsonia.** MAGPIE.—Rare in the spring; common in fall and winter. May 27, 1921 I found a nest in a grove of willows along the Santa Fe River two miles southwest of Santa Fe. It was placed six feet up in a willow and contained five half grown young. Altitude 6,800 feet.

47. **Cyanocitta stelleri diademata.** LONG-CRESTED JAY.—Quite common in the foothills. Very common in the mountains, where I have seen them at an altitude of at least 11,000 feet. The birds keep very quiet during the period of incubation. Most nests found contained young. May 11, 1919, I found a nest containing five eggs in Apache Canyon twenty miles southeast of Santa Fe. April 30, 1922 a nest with five fresh eggs was located in a small spruce in the Santa Fe Canyon two miles above the

Elk's Cabin. The nests are usually less than ten feet from the ground. Sets average from three to five eggs. Fresh sets April 20–May 10.

48. **Aphelocoma woodhousei.** WOODHOUSE'S JAY.—Not as common as the Long-crested. It is more commonly a bird of the foothills than the mountains. A common nesting site is in a piñon pine two to four feet up. Average set, three eggs. Fresh eggs April 1–May 1.

49. **Perisoreus canadensis capitalis.** ROCKY MOUNTAIN JAY.—June 27, 1922, I saw two, I think a male and a female, on the Lake Peak trail. The birds were very tame. Altitude 11,500 feet.

50. **Corvus corax sinuatus.** RAVEN.—Rather common, nesting in almost inaccessible places in the rimrock and in box canyons. April 18, 1921 I located a nest in the "crater." It was placed fifty feet down on a little shelf. I wanted the eggs for my collection, so by fastening boards together until I had a rod seventy feet long, with a wire hoop and a bag at one end, I succeeded in lifting out the six eggs. May 8, the Ravens had built another nest nearer the surface and it contained a second set of six eggs. April 15, 1922 I again found a nest on the shelf referred to above in the "crater." This also contained six eggs.

April 22, a nest with six eggs was found on the rimrock near La Bajada Hill. It was placed in a pocket sixty feet from the bottom and fifteen feet from the top of the rock.

May 20, 1922 I found a nest on a cliff near the Lake Peak trail containing four half grown young. The La Bajada nest was at an elevation of 6,500 feet, and the Lake Peak nest 10,500 feet. The eggs in the two nests had been deposited at very near the same date, so it seems altitude makes no difference in the nesting time of the Raven.

Usually the Raven will leave the nest before I get very close, but the birds in the "crater" act differently. On one occasion a dozen shots from a highpower rifle were fired into the rim of the nest before the female left, and then it was only thirty seconds before she settled on the eggs again.

51. **Corvus brachyrhynchos hesperis.** WESTERN CROW.—Common, nesting in the cottonwood groves along the water courses. I have found nests along the Pecos River near Valley Ranch, in the Santa Fe Canyon, along the Nambe River, between Nambe Falls and Pojaque, and along the Rio Grande near San Juan and Santa Clara Indian pueblos. The average number of eggs seems to be five. Fresh sets in the latter part of April.

52. **Nucifraga columbiana.** CLARKE'S NUTCRACKER.—Abundant in the higher parts of Sangre de Cristo and the Jemes Mountains.

May 15, 1921, I saw a pair feeding young out of the nest near Granite Point ranger station in the Santa Fe Canyon. Altitude 7,500 feet. July 4, 1921 three nests with young were located in a small caynon below Santa Fe Lake. Altitude 12,000 feet. May 8, 1922, I saw birds flying with nesting material in the Santa Fe Canyon—this at an altitude of 8,500 feet. Although I spent considerable time searching, I did not find any nests.

53. **Cyanocephalus cyanocephalus.** PIÑON JAY.—This pretty little Crow is very common on the Piñon Flats, and sometimes seen in flocks of hundreds or thousands. Even in the nesting season they can be seen together in large numbers, and are often found nesting in colonies. On account of the roving habits of these birds, it is rather good luck to find the nests, as they never seem to be in the same locality twice, and furthermore, the nesting season extends from February to June, during which time fresh eggs may be found. They seem to nest whenever and wherever time and place suit them best. May 18, 1918 I found a set of four fresh eggs, and on March 19, 1921 a colony of thirteen nests each containing four young, some full grown. The average number of eggs seems to be four, but three is quite common. Of the fifty-four nests examined only six contained five eggs, and one had six young.

March 15, 1922, I located a colony of seventeen nests three miles south of the U. S. Indian School—all with fresh sets as follows: two, three; eleven, four; and four, five. The colony covered about ten acres.

The nests are quite bulky. Bark strips, weeds, wool and hair well felted together form the warm inner nest which rests on a rough platform of dry sticks. The birds sit so close they can be touched. All the nests found were placed from two to eight feet from the ground—average height five feet, and all but one were built in piñon pines, this one being placed four feet up in a juniper.

The birds nesting in colonies usually breed much earlier than the single pairs.

Mexican ranchers believe that the Piñon Jay does not nest at all.

54. **Molothrus ater ater.** COWBIRD.—Common. I have found the eggs deposited in the nests of the Western Chipping Sparrow, Brewer's Sparrow and House Finch.

55. **Xanthocephalus xanthocephalus.** YELLOW-HEADED BLACKBIRD.—Flocks are often seen during the spring. I have never found the nest but believe they breed in the swamp along the Rio Grande.

56. **Agelaius phoeniceus neutralis.** SAN DIEGO RED-WING.—Common, usually nesting in the willows along the rivers, from ten to twelve feet above the ground; but I have also found the nests in junipers. Average set four (3–5). Fresh sets May 20–June 15.

57. **Sturnella neglecta.** WESTERN MEADOWLARK —Common on the Piñon Flats and in cultivated fields. Average set, five eggs. Fresh sets May 20–June 10.

58. **Icterus bullocki.** BULLOCK'S ORIOLE.—Common, nesting in Lombardy poplars, large cottonwood, box elders and sometimes in the very tip-top of a pear tree. Average set, four eggs (3–5). Fresh sets June 10–20.

59. **Euphagus cyanocephalus.** BREWER'S BLACKBIRD.—A few pairs nest occasionally along the rivers in willows and other shrubs. June 3, 1919, I collected a fresh set of six eggs from a nest in an apple tree twelve feet from the ground. June 13, 1919, a nest was located in a rather peculiar position, as it was placed like the nest of an Oriole

near the end of a drooping limb of a large cottonwood, sixteen feet up and twenty feet out from the trunk of the tree. During the fall of 1920 a large flock spent several days near the U. S. Indian School, and among these was one with several pure white feathers in wings and tail.

60. **Hesperiphona vespertina montana.** WESTERN EVENING GROSBEAK.—During April and the early part of May 1918, I saw my first Evening Grosbeaks. A flock of about fifty birds spent about six weeks on the U. S. Indian School campus. This was repeated in 1919 and 1920. February 4, 1921, a flock of sixteen arrived and stayed three days. These were the only birds seen during 1921. In the spring 1922, only a few birds put in an appearance during April and May. In the fall I have seen on a number of occasions quite large flocks on the Piñon Flats feeding on juniper berries. June 3, 1922, I saw a pair carrying nesting materials. I had very little time then to watch the birds, but later I spent considerable time searching, but was unable to locate the nest. Several times, however, I saw the male in the same locality.

This was in the Santa Fe Canyon at an altitude of 7,500 feet, and the mountains there are covered with a growth of large Douglas firs.

61. **Pinicola enucleator montana.** ROCKY MOUNTAIN PINE GROSBEAK.—June 27, 1922, I saw two birds, male and female, in a large spruce close to the cabin on Lake Peak. Altitude 12,000 feet.

62. **Carpodacus mexicanus frontalis.** HOUSE FINCH.—Abundant. They are causing a lot of damage to fruit crops. They eat peaches, pears and apples, until only a shell is left. They are not at all particular about a nesting site as they build in the branches of a tree, in cavities of trees and walls, in tin cans hanging on fence posts, and I have even seen a nest on the ground under a rabbit weed. It is one of the few birds which will use a "cholla" cactus for nesting site. Average set four eggs (3–5). Fresh sets April 1–August 1.

63. **Astragalinus psaltria psaltria.** ARKANSAS GOLDFINCH.—Abundant. During 1921, twenty-two pairs were nesting on the Indian School campus. Average set four (3). Fresh sets June 15–October 1.

64. **Spinus pinus pinus.** PINE SISKIN.—Common on the Indian School campus during April and May. About June 1, they leave for the mountains. June 3, 1920, my son found a nest with four eggs on the campus. It was placed on a horizontal limb of a box elder 12 feet up. This is my only breeding record of this species. I have often seen the birds in the mountains, and June 26, 1922, I saw a pair near the ranger's cabin on Lake Peak. Altitude 12,000 feet.

65. **Passer domesticus.** ENGLISH SPARROW.—Abundant. During the spring and summer 1919, I destroyed 1020 eggs on the Indian School campus.

66. **Pooecetes gramineus confinis.** WESTERN VESPER SPARROW.—Common on the Piñon Flats and in the cultivated fields. July 4, 1918, I located a nest of the Vesper Sparrow a short distance south of the Indian School, under a small juniper. It contained two eggs and two young. Straight above it, and only six inches up, was a nest of a Brewer's Sparrow

with one egg and three young. Average set, three or four eggs. Fresh eggs May 15–July 15.

67. **Chondestes grammacus strigatus.** WESTERN LARK SPARROW.—Fairly common as a nesting bird through the Piñon Flats.

68. **Zonotrichia leucophrys leucophrys.** WHITE-CROWNED SPARROW.—Common in the spring, and I have seen them as late as July 1 in the willow thickets near the Santa Fe River.

69. **Spizella passerina arizonae.** WESTERN CHIPPING SPARROW.—Abundant, nesting up to 8,500 feet.

70. **Spizella breweri.** BREWER'S SPARROW.—Locally abundant. From the Indian School, south and west for about three miles, it nests in large numbers, and I have often found a dozen nests in a three to four mile walk. The nests are usually placed low in junipers, but also in sage brush. Average set, three (2–4). Fresh sets May 20–July 10.

71. **Junco phaeonotus dorsalis.** RED-BACKED JUNCO.—Common from 7,500 to 9,500 feet. June 5, 1922, my friend Mr. John S. R. Hammitt collected a set of four fresh eggs near Summount Sanitorium, two miles east of Santa Fe. The nest was placed under a bunch of grass on a dry mountainside, and well concealed. The female flew off the nest almost under his feet, and although he waited patiently for more than an hour, it never returned. I have several times seen the birds building, in which case the nests always have been abandoned. I have seen three nests with four young each. Average set seems to be four. Fresh eggs in the early part of June.

72. **Junco phaeonotus caniceps.** GRAY-HEADED JUNCO.—During the latter part of June, 1922, I spent a few days camping on Lake Peak and found these birds fairly common from 11,500 to 12,400 feet. Although I found no nests, the birds were evidently breeding at that time.

73. **Melospiza melodia montana.** MOUNTAIN SONG SPARROW.—A few pairs have nested in the willows along the river between Santa Fe and the reservoir at the mouth of the canyon. June 19, 1921, I found a nest with four fresh eggs placed three feet up in a willow on the river bank. I have seen nests as high up as 12 feet, usually placed in some vine clinging to the willows.

74. **Pipilo maculatus montanus.** SPURRED TOWHEE.—Fairly common in the foothills. May 31, 1920, I collected a set of four fresh eggs two miles southeast of Santa Fe. The nest was placed under a small sagebrush and well concealed.

75. **Pipilo fuscus mesoleucus.** CAÑON TOWHEE.—Abundant on the Piñon Flats. The nests are usually placed two to four feet up in piñon pines or junipers; also in sagebrush. April 14, 1918, I found a Towhee nesting under rather unusual conditions. In passing an old board shed, I saw a bird enter the building through a large knothole, and on investigating I found a nest with three newly hatched young. The nest was built of straw and weeds placed on a cross timber supporting the side of

the barn, and a foot to one side of the entrance hole. This is by far the earliest nesting record, as the usual time is from May 20–July 15. Average set, three eggs. Sets of two are common, and I have only seen two sets of four eggs each.

76. **Oberholseria chlorura.** GREEN-TAILED TOWHEE.—Common from 7,500 to 9,000 feet wherever sage, juniper and rosebushes form a thicket. All the nests I have found were within a few hundred feet of water. Average sets, four eggs (3). Fresh eggs, May 20–July 10.

77 **Zamelodia melanocephala.** BLACK-HEADED GROSBEAK.—Very common. Two or three pairs nest on the Indian School campus. Nests are common in the willows along the streams and in the scrub oaks on the mountain sides up to 10,500 feet. Average set, three eggs (4). Fresh sets May 20–July 1.

78. **Guiraca caerulea lazula.** WESTERN BLUE GROSBEAK.—Common in the willows along the streams and also in orchards where they usually nest in peach trees. The Blue Grosbeak seems as partial as the Crested Flycatcher is to using a cast-off snake skin for nesting material and of twenty-three nests located here during the last five years, twenty-one had as a foundation a snake skin, or part of one. Average set three eggs (2–4). Fresh eggs June 15–August 1.

79. **Passerina amoena.** LAZULI BUNTING.—June 13, 1921, I located a nest placed eight feet up in a bunch of willows on the river bank above Santa Fe. It was built of the same materials as the nest of the Blue Grosbeak, and although it looked small I set it down as such. June 19, I happened to pass the place again, and to my surprise found the female Lazuli Bunting on the nest. She left the nest, but kept fluttering among the branches uttering sharp "chips" and immediately the male arrived, so I had a good view of both birds. The nest contained a set of four eggs in which incubation had just commenced. Altitude 7,100 feet.

80. **Calamospiza melanocorys.** LARK BUNTING.—May 25, 1919, I saw male and female on the flats below La Bajada Hill. May 7, 1922, I saw four males and one female two miles south of the Indian School, and the same day, six miles south of the Indian School, about fifty birds in a flock. August 4, 1922, male and female near San Ildefonso Pueblo.

81. **Piranga ludoviciana.** WESTERN TANAGER.—Common in the mountains from 7,500 to 10,000 feet. Most of the twelve nests located were placed on horizontal branches of Douglas firs, ten to twelve feet up and as far from the trunk of the tree. Only one nest was placed in a scrub oak. Average sets three to four eggs. Fresh sets June 1–15.

82. **Petrochelidon l. lunifrons.** CLIFF SWALLOW.—Common, nesting in large colonies on cliffs and often under the cornices of buildings. About one hundred and fifty pairs are nesting on the sandstone cliffs near La-Bajada Hill. Another colony is on a cliff facing the Rio Grande near Cochiti Indian Pueblo.

83. **Hirundo erythrogastra.** BARN SWALLOW.—Common. June 22, 1918, I collected a set of six fresh eggs from a nest placed in one of the building at the Indian School. Average set five eggs (6). Fresh sets June 1-July 1.

84. **Tachycineta thalassina lepida.**—NORTHERN VIOLET-GREEN SWALLOW. Very common, nesting from 6,500 to at least 10,500 feet. June 18, 1922, I found a nest with young inside the wall of a frame building at the Indian School. The birds gained entrance through a knothole.

They nest commonly in the dead tops of large pines, where they utilize Woodpecker holes for nesting sites. In the mountains a hole in a quaking aspen is often used. In the Santa Fe Canyon, about twenty pairs build in cracks and crevices in Monument Rock, a 150 foot sandstone cliff jutting out in the canyon like a steeple. At an altitude of 7,000 they nest from June 1 to June 15; but at 8,000 feet nesting does not commence until sometime in July. Average set, five eggs.

85. **Riparia riparia.** BANK SWALLOW.—Common. June 13, 1918, I found two nests in the side of a dry arroyo near the Indian School. A large colony is nesting in the Santa Clara Canyon in the Jemes Mountains.

86. **Lanius ludovicianus excubitorides.**—WHITE-RUMPED SHRIKE. Very common on the Piñon Flats. Average set, six eggs (5–7). Fresh eggs April 20–June 1.

87. **Vireosylva gilva swainsoni.** WESTERN WARBLING VIREO.—Abundant in the mountains where they nest in quaking aspens. Average set, four eggs (3–5). Fresh eggs June 1–15.

88. **Lanivireo solitarius plumbeus.** PLUMBEUS VIREO.—Locally common. May 31, 1920, I collected a set of four fresh eggs from a nest on a piñon pine, three feet up, ten miles southeast of Santa Fe. Altitude 7,500 feet.

89. **Dendroica aestiva aestiva.** YELLOW WARBLER.—Common in the willows along the streams, nesting up to 7,500 feet. Average set four eggs. Fresh sets June 1–15.

90. **Dendroica auduboni auduboni.** AUDUBON'S WARBLER.—Common from 7,500 to 10,000 feet. The nests are usually placed on a horizontal limb of a pine or spruce, but also among dead twigs on the trunks of cottonwoods, and even in a cavity of some tree. All nests found were lined with a few feathers of Bluebirds and Long-crested Jay. June 6, 1920, I collected a set of four somewhat incubated eggs. It was placed among dead limbs of a cottonwood, ten feet up. June 5, 1921, I found a nest containing five fresh eggs near the top of a small yellow pine, about twenty feet up.

If a nest with young is discovered, both parent birds try every means possible to draw the attention of the intruder away from the nest. Often I have seen them drop with folded wings from the top of a tree and flutter among the leaves as if each had a broken wing. Average set, four eggs (3–5).

91. **Dendroica graciae.** GRACE'S WARBLER.—Not uncommon in the Sangre de Cristo Mountains. June 26, 1922, I saw a male on Lake Peak. Altitude 12,400 feet and June 13, 1922 three near the Lake Park trail, 9,000–10,000 ft.

92. **Dendroica nigrescens.**—BLACK-THROATED GRAY WARBLER. Not very common, but once in a while I see a few birds on the Piñon Flats where they nest. May 22, 1920, a little Indian girl found a nest in the top of a small piñon pine three feet up. It contained four fresh eggs. June 11, 1922, I found a nest with two fresh eggs, with the parent birds near; but a few days later only an empty nest remained. This nest was also placed in a piñon pine, five feet up. Both nests were near Arroyo Hondo about six miles southeast of Santa Fe.

93. **Oporornis tolmiei.** MACGILLIVRAY'S WARBLER.—On rare occasions this Warbler visits my garden and feeds on insects mainly on the rosebushes.

94. **Geothlypis trichas occidentalis.** WESTERN YELLOW-THROAT.—Not common. I see a few in my garden occasionally or among the willows near the river.

95. **Icteria virens longicauda.** LONG-TAILED CHAT.—Three or four pairs are nesting along the Santa Fe river in a distance of as many miles. The nests are usually placed in a bunch of willows or in a tangle or vines, two to four feet up. Average set, four eggs. Fresh sets June 10-July 1.

96. **Wilsonia pusilla pileolata.** PILEOLATED WARBLER.—Not common in the Sangre de Cristo Mountains, where I have seen them up to 10,500 feet. I have only one nesting record. June 5, 1921, near Monument Rock in the Santa Fe Canyon, I found a nest with five fresh eggs. The nest was placed on the mountain side, well concealed in the edge of a large heap of dry leaves near a little stream.

97. **Anthus rubescens.** PIPIT.—Common on the grass-covered mountain tops in the Sangre de Cristo range between 12,000 and 13,000 feet. June 21, 1920, I saw several birds above timberline near Lake Peak. The males could be seen hovering in the air singing, and the notes were similar to those of the Meadow Pipit (*Anthus pratensis*). June 26, 1922, I saw five birds in the same place.

98. **Cinclus mexicanus unicolor.** DIPPER.—Common along the mountain streams. I have often found the nests on sheer rocks facing the stream, usually two to four feet above the water. A nest seen on the Pecos River near Cowles was placed in a little pocket in the face of a cliff twenty-five feet above the water. If a set of eggs is taken, the Dipper will deposit another set in the same nest. I have seen this repeated three times. I believe that some writers who exalt the beauty of these nests overdo it somewhat. The nests here, although strongly built, are rather coarse structures of mosses, weed stems, and pine needles, and they appear to fade quickly. Average sets, four or five eggs (3–6). Fresh sets April 1–May 15.

99. **Oreoscoptes montanus.** SAGE THRASHER.—July 3, 1921, I saw my first Sage Thrasher. Mr. Ligon of the Biological Survey called my attention to a pair of birds on the Piñon Flats three miles south of the Indian School. May 30, 1922, I located a nest in the same locality. It was placed one foot up in a juniper and contained three half grown young. Nearby I saw two more pairs of Sage Thrashers.

100. **Mimus polyglottos leucopterus** WESTERN MOCKINGBIRD. —Abundant on the Piñon Flats. Average set, four eggs. Fresh sets June 1–15.

101. **Dumetella carolinensis** CATBIRD.—June 24, 1918, a pair was feeding young in a garden in San Juan Indian Pueblo. June 13, 1921, I located a nest with four fresh eggs. It was placed six feet up in a thicket of young cottonwoods on the Santa Fe River off College Street in the city of Santa Fe. June 15, 1922, I found a nest in a tangle of willows and vines about a mile from the former. It contained a set of five eggs in which incubation had just commenced. I believe these nestings to be records for northern central New Mexico.

102. **Salpinctes obsoletus obsoletus** ROCK WREN.—These birds used to nest rather frequently in arroyos near the Indian School, but have now been driven out. They are quite common, however, near the entrance to the Santa Fe Canyon and towards Glorieta. In 1920, Dr. A. V. Kidder showed me a nest in the ruins of the deserted Pecos Indian Pueblo. June 26, 1921, I cut into a finished, but empty nest, in the same place.

103. **Catherpes mexicanus conspersus.** CAÑON WREN.—Common near the foot of La Bajada Hill and in Canyon el Diablo near Buckman.

104. **Troglodytes aëdon parkmani.** WESTERN HOUSE WREN.—Abundant, nesting at least up to 9,000 feet. June 22, 1922 I found a nest in the Santa Fe Canyon near the Elk's Cabin. It was placed in a cavity of a quaking aspen. The opening in the tree is fully two feet high, and the birds had filled it in with small sticks so only a small entrance hole was left at the top. The Wren nests very often in my bird boxes. Average set, six eggs (4–7). Fresh eggs June 10–July 1.

105. **Certhia familiaris montana.** ROCKY MOUNTAIN CREEPER.—A common spring visitor to the Indian School campus, but I very rarely meet it in the mountains.

106. **Sitta carolinensis aculeata.**—SLENDER-BILLED NUTHATCH. Common. May 27, 1920, I found a nest in a cavity in an oak ten miles southeast of Santa Fe. I cut into it, and found small young; closed the opening and watched the birds raise the family. May 15, 1921, I examined the nest and found a set of eight heavily incubated eggs, which I left, and these also were hatched and raised. Several pairs nest in the Santa Fe Canyon up to 7,800 feet.

107. **Sitta pygmaea pygmaea.** PYGMY NUTHATCH.—Common from 7,500 to 10,000 feet. All of eight nests found were placed in pine stump

in holes excavated by the birds. Sets, six to seven eggs. Fresh eggs June 1–15.

108. **Baeolophus inornatus griseus.** GRAY TITMOUSE.—Nest abundantly in bird boxes placed in piñon pines, three to five feet from the ground. They seem to be most common in altitudes from 6,500 to 8,000 feet. Average set, five eggs (4–6). Fresh eggs, May 1–June 10.

109. **Penthestes gambeli gambeli.** MOUNTAIN CHICKADEE.—Common, often nesting in bird boxes in altitudes from 7,500 to 10,000 feet. I have also found the nests in cavities in pine stumps, in quaking aspens and under rocks. May 14, 1921, a nest with eight fresh eggs was located in a Bluebird box eight miles east of Santa Fe. May 30, 1921, a nest with seven eggs, also in a box, was found in the same locality. June 5, 1921, a nest containing eight well incubated eggs was found in a pine stump in the Santa Fe Canyon, and a nest with seven fresh eggs was located in a quaking aspen near the Elk's Cabin the same day.

110. **Polioptila caerulea obscura.** WESTERN GNATCATCHER.—Frequently seen in pairs or small flocks on the Piñon Flats during May and June. No nesting records.

111. **Myadestes townsendi.** TOWNSEND'S SOLITAIRE.—Common in the Sangre de Cristo Mountains above 8,000 feet. June 22, 1920, I located my first nest of this species. It was in a clay bank beside the road in the Santa Fe Canyon. The bird had evidently scratched the little pocket out in which the eggs were deposited. The four eggs were resting on the bare ground, and there was not even a suggestion of nest building. The same day, I found three more nests, all in similar positions; but these nests were quite bulky—made of pine needles, weeds and sticks, and so loosely and carelessly put together that they fell apart upon removal. One of these nests contained four, and one five, fresh eggs, while the third held five young about ready to leave the nest. June 16, 1921, a nest with three eggs was found in the same locality. June 11, 1922, a nest with three well incubated eggs; June 27, 1922, one with four small young, and July 12, 1922, one with four fresh eggs were located in the same locality. All of the nests, excepting the first found, were rather bulky, some consisting of almost a peck of rubbish and most of them looked more like a heap of trash than a nest. The birds, while incubating, sit very close.

112. **Hylocichla guttata auduboni.** AUDUBON'S HERMIT THRUSH.—Common in the Sangre de Cristo Mountains from 7,500 feet to timberline. It is a rather retiring bird nesting in shady, dark places. The nests are usually placed low in a small pine or spruce, but I have also found them in willows and on the tops of pine stumps or behind loose bark on aspens. Average sets, nearly always four eggs (3–5). Fresh eggs June 10–July 1.

113. **Planesticus migratorius propinquus.** WESTERN ROBIN.—Abundant; nesting all through the territory covered. June 26, 1922 a pair had just completed a nest in a small spruce near the ranger's cabin on Lake Peak. Altitude 12,000 feet. The Robin is very destructive to

crops of small fruits. Average set, four eggs (3–5). Fresh eggs April 20–July 10.

114. **Sialia mexicana bairdi.** CHESTNUT-BACKED BLUEBIRD.—Common from 7,500 to 9,000 feet. Average set, 5 eggs (4–6). Fresh sets May 20–June 20.

115. **Sialia currucoides.** MOUNTAIN BLUEBIRD.—Abundant to 8,000 feet. Average set, five eggs. Fresh sets May 1–June 20.

United States Indian School,
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OBSERVATIONS ON THE BIRD LIFE OF PORTO RICO.

BY PARKE H. STRUTHERS.

IT has been my privilege during the past eighteen months to study bird life in Porto Rico and the two neighboring islets Mona and Desecheo. Much of the time has been spent in preparing a collection which includes all the species referred to in the following notes. The data, with but two exceptions, was obtained from observations made on the western third of the island, that is, all west of a line drawn between Arecibo and Ponce.

Of the one-hundred and sixty odd bona fide species and subspecies recorded from Porto Rico, Mona and Desecheo, nearly one half migrate elsewhere for a part of the year. Certain resident species have a tendency to migrate locally, while on the other hand there are species that have not been recorded outside of a twenty-five mile radius.

The following notes do not cover all the species recorded for the region, but those which I have had the opportunity to observe. The data are presented with an idea of increasing the supply of knowledge already at hand concerning the dates of migration to and from the region together with some observations on breeding species.

Podilymbus podiceps antillarum (Bangs). ANTILLEAN GREBE.—Seen throughout the year, although more common from October to May. February 18, 1922, I photographed a nest containing six eggs. A male collected December 10, 1921, was still in summer plumage.

Colymbus dominicus dominicus (Linnaeus). WEST INDIAN GREBE.—Observed throughout the year on the large lagoons. Nests with from one to seven eggs were noted from November 5, 1920 to April 2, 1921.

During the summer this Grebe congregated in large flocks in the center of the lagoons.

Phaëthon americanus (Grant). YELLOW-BILLED TROPIC BIRD.—A pair were noted January 17, 1922, on the cliffs west of Quebradillas. On Mona Island they were very common July 14 to 18, 1921.

Pelecanus occidentalis (Linnaeus). BROWN PELICAN.—Observed throughout the year. A rookery near Aguirre was visited January 31, 1922, and one near Rincon, March 4, 1922. One pair were noted on Mona Island July 16, 1921.

Sula leucogastra (Boddaert). BOOBY.—Occasionally seen along the coast of Porto Rico. Many were found on Mona Island in July 1921, especially birds in the first year plumage. I estimated that there were twenty-five hundred individuals on Desecheo, at the time of my visit in January, 1922, many of which were nesting.

Sula piscator (Linnaeus). RED-FOOTED BOOBY.—A colony of about two hundred individuals were nesting on Desecheo at the time of my visit in January 1922. The nests consisted of a platform of sticks placed in the West Indian birch (*Elaphrium simarubra*).

Fregata magnificens (Matthews). MAN-O'-WAR-BIRD.—Often seen flying along the coast and over the large lagoons. About thirty birds were noted on Mona Island in July, 1921. At the time of my visit to Desecheo in January, 1922, I estimated that there were about three hundred individuals practically all of which were nesting. Three separate rookeries were found.

Nyctanassa violacea (Linnaeus). YELLOW-CROWNED NIGHT HERON.—Noted throughout the year about the lagoons of the Guanica Valley and in the mangrove swamps along the coast.

Nycticorax nycticorax naevius (Boddaert). BLACK-CROWNED NIGHT HERON.—On October 29, 1921, I found a flock of six birds, two adults and four immature, in a grassy meadow near Mayaguez. Several other observations were made at Anegado lagoon one mile south of La Plata.

Butorides virescens cubanus (Oberholser). CUBAN GREEN HERON.—Very commonly observed in the lowlands. Nests containing three eggs each, were found in the reeds at Guanica lagoon, April 2, 1921.

Florida caerulea caerulescens (Latham). LITTLE BLUE HERON.—Very commonly observed in the lowlands. Four nests containing young birds were found in the mangroves west of Boqueron June 15, 1921.

Hydranassa tricolor ruficollis (Gosse). LOUISIANA HERON.—Occasionally seen singly throughout the year in the mangrove swamps and along the grassy shores of lagoons.

Egretta candidissima candidissima (Gmelin). SNOWY EGRET.—This species is apparently becoming common again for on all trips to the large lagoons and the mangrove swamps near Boqueron I saw from fifty to two hundred individuals.

Casmerodius egretta (Gmelin). AMERICAN EGRET.—Ten individuals were noted throughout the year in the mangrove swamps near Boqueron.

Ardea herodias adoxa (Oberholser). WEST INDIAN GREAT BLUE HERON.—Five birds made their home on the shallow east shore of Anegado lagoon, where they were noted on all trips to the region. Two individuals were seen in the mangroves near Boqueron June 15, 1921.

Ixobrychus exilis exilis (Gmelin). LEAST BITTERN.—Observed frequently at Anegado and Guanica lagoons. Eggs were collected, on April 2, 1921, from a nest built in the rushes bordering Guanica lagoon.

Botaurus lentiginosus (Montague). BITTERN.—One was taken on September 23, 1921, in a mangrove thicket south of Bouqueron.

Erismatura jamaicensis (Gmelin). RUDY DUCK.—Observed throughout the year on the larger lagoons. During the period from December 1, 1921 to March 1, 1922, I found twenty-two nests at Anegado lagoon. Each nest contained from one to twelve eggs. Only one nest with downy young was found (February 18).

Marila affinis (Eyton). LESSER SCAUP DUCK.—Noted during the months of December, January and February on the large lagoons, in flocks numbering from fifty to two-hundred individuals.

Poecilonetta bahamensis (Linnaeus). BAHAMA PINTAIL.—Observed throughout the year on the large lagoons. A flock of eight young birds, unable to fly, were seen December 8, 1921, and twelve eggs were taken from a nest, on February 18, 1922, at Anegado lagoon.

Spatula clypeata (Linnaeus). SHOVELER.—A flock of six were seen February 18, 1922, at Anegado lagoon.

Querquedula discors (Linnaeus). BLUE-WINGED TEAL.—Seen during the winter at Catagena and Anegado lagoons. My earliest fall record was October 8, 1921. The birds arrived from the north in flocks numbering sometimes three-hundred individuals, but these were soon divided into small groups which scattered over the flooded forest and grass lands bordering the lagoons.

Dendrocygna autumnalis (Linnaeus). BLACK-BELLIED TREE DUCK.—On December 3, 1921, I found four roosting in some dense bushes at Anegado lagoon. February 18, 1922, in the same region, I collected two eggs and two nestlings from a hollow in a dead tree. A native living near Caba Rojo has a flock of six which he captured a year ago when the birds were young.

Cathartes aura aura (Linnaeus). TURKEY VULTURE.—About fifty individuals inhabit the Guanica valley and only twice have I recorded the Vulture outside of this region. June 13, 1921, an observation was made near Anaisco and another December 23, 1921, at Ponce. An immature male was collected at Catagena lagoon in August 1921.

Falco sparverius loquacula (Riley). PORTO RICAN SPARROW HAWK.—Observed throughout the year in the coastal plains. Two young birds, unable to fly, were noted July 30, 1921, in a cocoanut grove near Anaisco.

Falco columbarius columbarius (Linnaeus). PIGEON HAWK.—A male bird was collected November 8, 1920, in a coffee finca belonging to the Federal Experimental Station at Mayageuz.

Falco peregrinus anatum (Bonaparte). DUCK HAWK.—Observed during the winter at Catagena and Anegado lagoons. A male bird was collected December 3, 1921, at Anegado lagoon. My earliest fall record was August 8, 1921.

Buteo borealis (Gmelin). RED-TAILED HAWK.—Observed throughout the year in the foot-hills and mountains. A nest with two eggs was found April 16, 1921 near Mayaguez.

Accipter striatus venator (Wetmore). PORTO RICAN SHARP-SHINNED HAWK.—Taken November 11 and December 26, 1921, near Maricao.

Pandion haliaëtus carolinensis (Gmelin). OSPREY.—A male bird was taken on the cost two miles west of Boqueron January 15, 1921.

Fulica americana (Gmeln). AMERICAN COOT.—Observed throughout the year at Catagena and Anegado lagoons. Nests containing from four to seven eggs were found at Anegado from November 11, 1921 to March 1, 1922. A negro egg hunter, whom I met at the lagoon February 18, 1922, boasted that during the previous month he had collected twelve hundred Coot eggs. His statement was confirmed by the station agent at La Blata through whom the eggs were sold. During the summer of 1921, Guanica and Anegado lagoons dried up completely leaving Catagena as the only refuge for the water birds living in the valley. A survey of the birds at Catagena during this period,made by myself, showed the Coots to be by far the most abundant specie present and numbering about three thousand individuals.

Gallinula galeata galeata (Lichtenstein). FLORIDA GALLINULE.—Seen throughout the year in the lagoons and swamps. Four eggs were collected from a nest at Anegado lagoon, December 10, 1921. A nest with seven newly hatched young was found at Catagena, August 18, 1921.

Ionornis martinicus (Linnaeus). PURPLE GALLINULE.—An occasional observation was made throughout the year at Catagena. A flock of ten birds, four in immature plumage, was observed at Anegado lagoon February 18, 1922.

Porzana carolina (Linnaeus). CAROLINA RAIL.—Observed during the winter about the large lagoons. My earliest fall record was October 8, 1921, and the latest spring record March 25, 1921.

Rallus longirostris caribaeus (Ridgway). CARIBBEAN CLAPPER RAIL.—Seen in the mangrove swamps along the coast throughout the year. Eight eggs were collected September 23, 1921, near Boqueron.

Ochthodromus wilsonius rufinuchus (Ridgway). RUFOUS-NAPED PLOVER.—Collected July 23, 1921, on the coast near Anaisco and again July 25, 1921, at Porto Real.

Charadrius semipalmatus (Bonaparte). SEMIPALMATED PLOVER.—This specie was collected during every month in the year, although it was much more common from October to May.

Oxyechus vociferus rubidus (Riley). ANTILLEAN KILLDEER.—Observed throughout the year. Eggs were collected May 9, 1921, at Guanica lagoon.

Phivialis dominica dominica (Müller). GOLDEN PLOVER.—A male bird in winter plumage was collected from a flock of six flying over the mud flats at Anegado lagoon November 4, 1921.

Arenaria interpres morinella (Linnaeus). RUDDY TURNSTONE.—Observed during the winter along the coast, especially in the vicinity of Guanajibo Point. My earliest fall record was August 9, 1921, and the latest spring record May 7, 1921. All birds seen were in winter plumage.

Actitis macularia (Linnaeus). SPOTTED SANDPIPER.—A very common specie in the coastal plains and observed throughout the year. Birds in immature plumage appeared along the shores about August first.

Bartramia longicauda (Bechstein). UPLAND PLOVER.—I examined a specimen collected by Mr. Frank Potts, in September, near the Aguirre Sugar Central.

Catoptrophorus semipalmatus semipalmatus (Gmelin). WILLET.—A flock of thirty birds were observed on all trips to the mangrove swamps south of Boqueron between November 1920, and March 25, 1921. On December 17, 1921 I saw two birds in the same swamp.

Tringa solitaria solitaria (Wilson). SOLITARY SANDPIPER.—Observed from November 1920, to May, 7 1921, on the edges of small salt water lagoons near Porto Real.

Totanus flavipes (Gmelin). LESSER YELLOW-LEGS.—A common winter visitor. My first fall record was August 1, 1921, and the latest spring record April 9, 1921.

Totanus melanoleucus (Gmelin). GREATER YELLOW-LEGS.—Observed frequently during the winter in the wet regions along the coast. My earliest fall record was July 23, 1921, and the latest spring record March 19, 1921.

Crocethia alba (Pallas). SANDERLING.—A pair were observed March 4, 1922, at the mouth of the Rio Blanco near Anaisco. They were with a flock of Semipalmated Plover. I collected one bird.

Pisobia minutilla (Vieillot). LEAST SANDPIPER.—Recorded each month in the year, but more abundant during September and May. One pair were seen July 15, 1921 on Mona Island.

Pisobia maculata (Vieillot). PECTORAL SANDPIPER.—They were very common at Guanica lagoon October 22, 1921. One or two birds were seen in the same region throughout the winter.

Gallinago delicata (Ord). WILSON'S SNIPE.—Very common at Guanica lagoon October 22, 1921. After November only a few birds were observed during the winter. My earliest fall record was August 29, 1921.

Himantopus mexicanus (Müller). BLACK-NECKED STILT.—Seen throughout the year about the large lagoons and mud flats near the coast. On August 1, 1921 eggs and young birds were collected at Guanica lagoon.

Larus atricilla (Linnaeus). LAUGHING GULL.—Observed during the summer about Mayaguex harbor. Thirty individuals were seen at Mona

inland during my visit in July 1921. My earliest spring record was April 23, 1921, and the latest fall record August 17, 1921.

Chlidonias nigra surinamensis (Gmelin). BLACK TERN.—Twenty individuals were noted, between August 18, 1921, and September 10, 1921, at Catagena lagoon. All specimens collected were in winter plumage.

Sterna fuscata (Linnaeus). SOOTY TERN.—Several were seen July 15, 1921 between Porto Rico and Mona Island.

Sterna antillarum (Lesson). LEAST TERN.—A flock of twenty were found nesting on a sandy beach near the lighthouse at Cape Rojo, August 9, 1921.

Sterna hirundo (Linnaeus). COMMON TERN.—A common summer visitor along the coast. My earliest spring record was March 4, 1922, and the latest fall record October 29, 1921.

Sterna maxima (Boddaert). ROYAL TERN.—Two birds were taken near Rincon lighthouse June 22, 1921.

Geotrygon montana (Linnaeus). RUDDY QUAIL-DOVE.—Seen eighteen times in the foot-hills and mountains.

Chaemepelia passerina trochila (Bonaparte). PORTO RICAN GROUND DOVE.—A very commonly observed specie throughout the coastal plains. Eggs were collected May 7, 1921, near Guanajibo point.

Chaemepelia passerina exigua (Riley). MONA GROUND DOVE.—Very common on Mona Island at the time of my visit in July, 1921.

Zenaida zenaida lucida (Noble). PORTO RICAN DOVE.—Seen throughout the year in the cocoanut and citrus groves in the coastal regions. One bird was taken on Desecheo island January 22, 1922. Eggs were collected during June, 1921.

Columba leucocephala (Linnaeus). WHITE-CROWNED PIGEON.—A pair were collected December 15, 1921, in a citrus grove near Mayaguez.

Columba squamosa (Bonnaterre). SCALED PIGEON.—Seen on trips to the mountains, especially during December and January when the birds congregated in the royal palms (*Roystonea borinquena*) to feed on the ripe berries borne by that tree. It was very common on Mona Island at the time of my visit in July 1921.

Coccyzus minor nesiotes (Cabanis). MANGROVE CUCKOO.—Common throughout the coastal plains.

Saurothera vieilloti (Bonaparte). VIEILLOT'S CUCKOO.—Very common at Maricao during my visits to the region. It was recorded six times in the hills near Mayaguez. I observed a pair building their nest February 13, 1921 near Consomo.

Crotophaga ani (Linnaeus). ANI.—Observed throughout the cultivated coastal plains.

Melanerpes portoricensis (Daudin). PORTO RICAN WOODPECKER.—Noted throughout the regions visited on Porto Rico.

Todus mexicanus (Lesson). PORTO RICAN TODY.—Common in the mountains and foot-hills and seen twice in the mangroves near the coast. A pair noted March 2, 1922 near Mayaguez were preparing their nesting burrow.

Ceryle alcyon alcyon (Linnaeus). BELTED KINGFISHER.—A commonly observed winter visitor. First fall record was on September 23, 1921, and the latest spring record May 21, 1921. A pair were seen on Mona Island, July 16, 1921.

Gymnasio nudipes nudipes (Daudin). BARE-LEGGED OWL.—Common in the foot-hills and coastal plains and occasionally encountered in the mountains. An immature bird, with its head still covered with down, was taken August 2, 1921 at Mayaguez.

Chordeiles virginianus minor (Cabanis). CUBAN NIGHTHAWK.—A male bird was collected August 9, 1921, near the lighthouse at Cape Rojo and another observed August 18, 1921 at Mayaguez.

Chlorostilbon maugoei (Audebert and Vieillot). PORTO RICAN EMERALD.—Common in all regions of Porto Rico visited. A nest containing two eggs was collected March 23, 1921 at Maricao.

Anthracothorax viridis (Audebert and Vieillot). GREEN MANGO.—Common in the coastal regions. A pair nested near my house during February 1922.

Anthracothorax aurulentus (Audebert and Vieillot). PORTO RICAN MANGO.—One was collected at Boqueron December 17, 1921. It was also observed several times at Maricao (December 28 to 31).

Nephoecetes niger jamaicensis (Ridgway). JAMAICAN BLACK SWIFT.—Observed December 11, 1920 at Guanica; June 30, 1921, at Mayaguez; August 29, 1921 and February 4, 1922 at Catagena lagoon.

Tyrannus dominicensis dominicensis (Gmelin). GRAY KINGBIRD.—Noted throughout the coastal plains, especially the dry south coast. Not observed in the mountains. One pair was taken on Mona Island July 16, 1921

Tolmarchus taylori (Sclater). PORTO RICAN PETCHARY.—Noted in the coastal regions, foot-hills and as far inland as Maricao. Ten birds were seen on Mona Island during my stay there in 1921.

Myiarchus antillarum (Bryant). ANTILLEAN FLYCATCHER.—Occasionally seen throughout the regions visited on Porto Rico.

Blacicus blancoi (Cabanis). PORTO RICAN WOOD-PEWEE.—Common in the foot-hills and around Maricao.

Hirundo erythrogastra (Boddaert). BARN SWALLOW.—Observed August 29, October 8, and March 21, 1921 at Catagena lagoon and February 18, 1922 at Anegado lagoon.

Riparia riparia riparia (Linnaeus). BANK SWALLOW.—Taken February 18, 1922 at Anegado lagoon.

Petrochelidon fulva poeciloma (Gosse). JAMAICAN CLIFF SWALLOW.—Observed throughout the year especially in the vicinity of lagoons and cultivated lands. Young birds were observed on the wing during the latter part of July 1921.

Progne dominicensis (Gmelin). CARIBBEAN MARTIN.—Observed throughout the summer. My earliest spring record was February 2, 1922 and the latest fall record October 8, 1921. Several nests were found

during May, 1921 in cavaties in dead cocoanut palms. Six pairs made their home in the tower of the Priest's house, situated in the center of Mayaguez.

Margarops fuscatus fuscatus (Vieillot). PEARLY-EYED THRASHER. —Two birds were taken December 29, 1921 at Maricao, where the specie was quite common. I only recorded it twice in the coastal plains, once in a cocoanut grove near Rincon and again in a hillside thicket near Mayaguez.

Mimus polyglottos orpheus (Linnaeus). JAMAICAN MOCKINGBIRD. —Common in the coastal plains and foot-hills, but not seen in the mountains.

Mimocichla ardosiacea portoricensis (Bryant). PORTO RICAN THRUSH.—A common specie in the citrus and coffee fincas. During my stay at Maricao in December 1921 they were congregated in the royal palms (*Roystonea borinquena*), where they feasted on the ripe berries.

Vireo latimeri (Baird). LATIMER'S VIREO.—Observed throughout the year in the wooded regions. During April especial attention was attracted to these birds by the active singing of the males.

Vireosylva calidris calidris (Linnaeus). JAMAICAN VIREO.—Observed throughout the summer. My earliest record for arrivals was February 12, 1921.

Setophaga ruticilla (Linnaeus). AMERICAN REDSTART.—Observed during the winter. The earliest fall record was September 23, 1921, and the latest spring record April 9, 1921. This was one of the commonest visiting Warblers.

Seiurus noveboracensis noveboracensis (Gmelin). WATER-THRUSH. —Observed during the winter in the coastal regions. The earliest fall record was September 23, 1921 and the latest spring record April 23, 1921.

Seiurus motacilla (Vieillot). LOUISIANA WATER-THRUSH.—Observed during the winter along the rivers and brooks. My earliest fall record was August 31, 1921, and the latest spring record March 25, 1921.

Seiurus aurocapillus (Linnaeus). OVEN-BIRD.—Frequently seen in the wooded foot-hills and mountains during the winter. I have never heard the characteristic northern call notes uttered in Porto Rico. My earliest fall record was October 18, 1921 and the latest spring record April 18, 1921.

Dendroica striata (Forster). BLACK-POLL WARBLER.—One bird was seen November eleventh and another November twelfth (1921) in a coffee finca near Maricao.

Dendroica adelaidae (Baird). ADELAIDE'S WARBLER.—A common Warbler on the bush-covered hillsides of the dry coastal plains. Several pairs were seen nesting during May 1921.

Dendroica dominica dominica (Linnaeus). SYCAMORE WARBLER.— One bird was observed in the shade trees at Aguirre Central January 29, 1922.

Dendroica coronata (Linnaeus). MYRTLE WARBLER.—Very common during the winter in the low bushes bordering the lagoons in the Guanica valley.

Dendroica caerulescens caerulescens (Gmelin). BLACK-THROATED BLUE WARBLER.—Specimens were collected December 27 and 30, 1921 in the dense wooded regions above Maricao.

Dendroica tigrina (Gmelin). CAPE MAY WARBLER.—Observed November 24, and January 14, 20 and 22, 1921, in a coffee finca near Mayaguez and on February 26, 1922 in a mangrove swamp south of Boqueron.

Dendroica discolor (Vieillot). PRAIRIE WARBLER.—Often seen during the winter in brush-covered pastures and the edges of fincas.

Dendroica petechia bartholemica (Sundevall). PORTO RICAN YELLOW WARBLER.—Often observed in the mangrove swamps and the wooded areas bordering lagoons.

Compsothlypis americana usneae (Brewster). NORTHERN PARULA WARBLER.—Observed throughout the winter in all regions visited (Porto Rico). The first fall record was August 10, 1921 and the last spring record May 7, 1921.

Mniotilta varia (Linnaeus). BLACK AND WHITE WARBLER.—Observed frequently in the coffee and citrus fincas of the foothill and mountain regions. I obtained one summer record July 15, 1921, but the general migration arrived in August. My latest spring record was April 18, 1921.

Coereba portoricensis (Bryant). PORTO RICAN HONEY CREEPER.—Very commonly observed in all regions visited on Porto Rico. I recorded some pairs breeding as many as four times in one year.

Spermestes cucullata (Swainson). HOODED WEAVER FINCH.—A resident observed usually in flocks of from five to twelve individuals. One flock nested in a royal palm tree on the Federal Experimental Station grounds at Mayaguez during during July, 1921.

Amandava melpoda (Vieillot). SCARLET-CHEEKED WEAVER FINCH.—This specie was common in the vicinity of Caba Rojo and was once taken at Anaisco.

Agelaius xanthomus (Sclater). YELLOW-SHOULDERED BLACKBIRD.—A common specie in the coastal plains especially near fresh or brackish water swamps and lagoons.

Icterus portoricensis (Bryant). PORTO RICAN ORIOLE.—Frequently observed in the citrus and coffee fincas and about royal palms.

Holoquiscalus brachypterus (Cassin). PORTO RICAN BLACKBIRD.—Common throughout the coastal regions. Eggs were collected at Anegado lagoon December 3, 1921, from nests placed in the low, thorny Palo de Royo (*Parkinsonia oculeata*) trees growing on the edge of the lagoon. I have also observed them nesting in the royal palm trees at Mayaguez.

Nesospingus speculiferus (Lawrence). PORTO RICAN TANAGER.—On all my trips to Maricao I found this specie inhabiting the citrus and coffee fincas, but did not see it elsewhere on the island.

Spindalis portoricensis (Bryant). PORTO RICAN SPINDALIS.—This specie was frequently seen in the citrus fincas and in the low vegetation growing along the beach at Boqueron.

Tanagra sclateri (Sundevall). PORTO RICAN EUPHONIA.—A male bird was collected near Mayaguez January 13, 1921. Natives coming from Arecebo sold many in the market-place at Mayaguez at fifty cents a piece, but in all instances I know of the birds soon died.

Loxigilla portoricensis (Daudin). PORTO RICAN GROSBEAK.—Observed on all trips to the coffee and citrus fincas in the foot-hills and mountains. A nest containing three eggs was collected near Mayaguez March 18, 1921.

Tiaris bicolor omissa (Jardine). CARIB GRASSQUIT.—A common resident observed throughout the regions visited on Porto Rico. Several pairs were noted nesting about my house. In each case the incubation period was eleven days. Several broods are raised each year by one pair.

Tiaris olivacea bryanti (Ridgway). BRYANT'S GRASSQUIT.—Occasionally seen in the coastal regions but more common in the mountains. I collected eggs November 22, 1921 at Maricao.

Coturniculus savannarum intricatus (Hartert). SANTO-DOMINGAN GRASSHOPPER SPARROW.—A flock of six birds were observed at Manati January 14, 1922 in the low bushes along the roadside. I did not see the specie on the western end of the island.

University of Porto Rico,
Mayaguez, P. R.

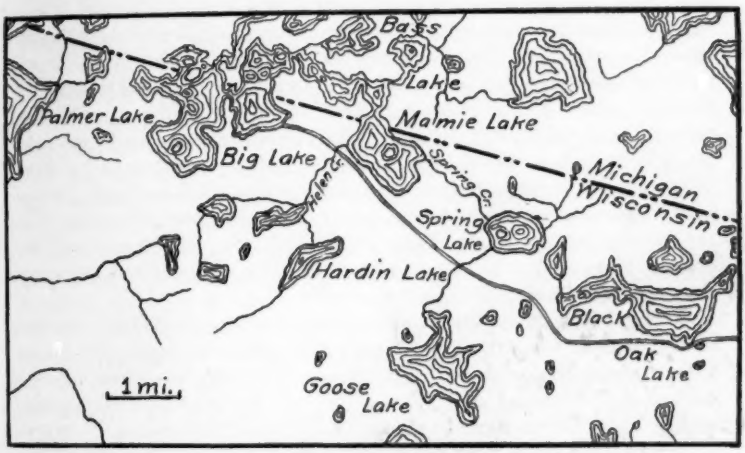
NOTES ON SUMMER BIRDS OF THE MAMIE LAKE REGION, WISCONSIN.

BY HARTLEY H. T. JACKSON.

Plates XXX

The list of birds here presented is a result of investigations in the region of Mamie Lake pursued as a part of a study of the distribution of the land vertebrates of Wisconsin under the auspices of the United States Biological Survey, the Wisconsin Geological and Natural History Survey and the University of Wisconsin cooperating. Two visits were made to the region; one extended from noon August 22 to the morning of August 31, 1917; the other from the afternoon of June 5, to the morning of June 24, 1918. During the first visit Dr. F. Gregory Hall was assistant in the work; during the second, Mr. Arthur J. Poole. Headquarters were

made at Bent's Camp, on the south side of Mamie Lake, both years. To Mr. B. R. Twombly, who resides at this camp, the writer is indebted for many courtesies and much assistance, which not only made our stay most pleasant and agreeable, but also made it possible for us to visit districts and secure results that otherwise would have been impossible.



MAP OF MAMIE LAKE REGION, WISCONSIN.

The region under consideration lies in northern Vilas County, Wisconsin, immediately adjacent to Michigan. In fact, the boundary line between the two states crosses the northern end of Mamie Lake, and a few of the observations, as indicated in the notes, were made in Michigan. The topography is typical of that of the lake region of northern Wisconsin; the surface is undulating, with numerous glacial hills and depressions; lakes, and bogs in various stages of formation, are characteristic of the area. The fauna and flora is largely representative of the Canadian life zone, among the plants being *Picea canadensis, Picea mariana, Abies balsamea, Larix laricina, Pinus strobus, Pinus resinosa, Pinus divaricata, Tsuga canadensis, Thuja americana, Taxus minor, Sorbus sichensis, Prunus pennsylvanica, Acer saccharum, Acer spicatum, Acer pennsylvanicum, Betula papyrifera, Betula lutea, Cornus canadensis, Salix bebbiana, Populus tremuloides, Populus grandidentata, Ledum*

groenlandicum, Kalmia glauca, Chamaedaphne calyculata, Gaultheria procumbens and *Oxycoccus macrocarpus.*

Gavia immer immer. LOON.—Not a day passed on either of our visits to the region but that Loons were heard or seen. On June 16, 1918, a nest containing two eggs was discovered at the border of a small clump of flags in Bass Lake, just over the Wisconsin line, in Michigan. The eggs were left unmolested. Two days later, June 18, another nest containing two eggs was found at Spring Lake, two miles east of Mamie Lake. These eggs were highly incubated, one being blown with difficulty through a large hole. The other was placed under a setting hen at Bent's Camp where incubation continued. The young chipped and cracked the shell the morning of June 23, but died before leaving the egg, probably on account of insufficient moisture. The male parent of the Spring Lake set was collected. Although Bishop considers breeding Loons from Wisconsin to belong to his subspecies *classon**, this particular bird is easily referable to *Gavia immer immer*. It measures: Wing (following the natural contour, as did Bishop, l. c.), 403 mm.; tail, 92 mm.; exposed culmen, 90 mm.; tarsus, 93 mm.; outer toe with nail, 117 mm. The egg measures 89.4 × 54.4 mm.

Sterna hirundo hirundo. COMMON TERN.—A single bird was shot as it flew from a pine snag in Mamie Lake, June 16, 1918. Its ovaries were moderately developed. Its stomach contained two *Perca flavescens* each about 2.5 inches long. I saw a Tern which was probably this species at Lac Vieux Desert some 15 miles east of Mamie Lake, June 10, and on June 8, at the same place, Miss Polly Bent saw two Terns which she said were similar to the Mamie Lake bird. Such birds are reported to occur regularly in summer on Lac Vieux Desert, and it seems possible that a small breeding colony of these birds may exist on this lake.

Anas platyrhynchos platyrhynchos. MALLARD.—A few Mallards are reported to breed in the vicinity of Mamie Lake. A pair was seen there the evening of June 23, 1918.

Aix sponsa. WOOD DUCK.—A female with a litter of downy young was noted in a beaver pond on Spring Creek, June 13, 1918. Two young, probably of the above-mentioned litter, were seen near the bridge across Spring Creek the evening of June 20.

Marila affinis. LESSER SCAUP DUCK.—Two females of this species with ovaries only moderately developed, were collected on Mamie Lake, June 16, 1918. The birds were together, well out from the shore in deep water, when shot. I am inclined to believe they were non-breeding birds.

Botaurus lentiginosus. BITTERN.—Heard frequently at Mamie Lake, June 5 to 24, 1918. One was seen in a cattail marsh at the mouth of Helen Creek, June 7.

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* Bishop, Louis B., Description of a new Loon, Auk, vol. 38, pp. 364–370, 1921.

Ardea herodias herodias. GREAT BLUE HERON. Common in the region where a dozen or more were observed each day of our visits (August 22 to 31, 1917, and June 6 to 24, 1918). During our June visit, one frequently alighted in the shallow water along the south shore of Mamie Lake where he had his accustomed fishing ground a few yards from our cabin. On two occasions he was observed to catch yellow perch (*Perca flavescens*) at least seven inches long.

Porzana carolina. SORA.—These birds were frequently heard in the grassy marshes on upper Spring Creek, June 7 to 23, 1918. During our visit in 1917, the only Rail seen or heard was a Sora which was caught, August 23, in a No. 1 steel trap set for a Marmot near a rock pile in a clover-timothy field 200 yards from marsh or water and at an elevation of 50 feet above either.

Tringa solitaria solitaria. SOLITARY SANDPIPER.—Solitary Sandpipers were encountered daily in the region August 22 to 31, 1917, where they were noted both near the lakes and along creeks. None was seen during June, 1918.

Actitis macularia. SPOTTED SANDPIPER.—Occasionally seen during June, 1918, particularly along the lower portions of Helen Lake. A nest containing four eggs seemingly fresh when tested by light, was found by the roadside 100 yards from Helen Creek bridge, June 10. The four eggs were still present June 17, but the following day, June 18, there were only two eggs, although the parent bird was still setting as she was up to the evening of June 23.

Oxyechus vociferus vociferus. KILLDEER.—It is reported that a few Killdeer regularly breed in the region. Two pairs were apparently nesting in the cornfield near Bent's Camp in June, 1918.

Canachites canadensis canace. CANADA SPRUCE PARTRIDGE.—Reported to occur, more particularly in a tamarack region about eight miles south of Mamie Lake. I spent two days hunting especially for this bird without success. Mr. B. R. Twombly informs me in a letter that a Spruce Hen was killed early in November, 1919, on Spring Creek where the road to State Line crosses it. He also told me in 1918 that he "shot one a few autumns ago near Bent's Camp."

Bonasa umbellus togata. CANADA RUFFED GROUSE.—For some reason, probably excessive hunting, but variously attributed to forest fires, wet breeding-seasons, and disease, Ruffed Grouse were rare in the region during the years 1915, 1916 and 1917. They seemed to be more plentiful near Mamie Lake in 1918 when they were frequently heard drumming (June 13 to 23) and one was seen flying across a logging road through an aspen thicket, June 10. A specimen was secured at Lac Vieux Desert, June 20, and one at Mamie Lake, June 22.

Cathartes aura septentrionalis. TURKEY VULTURE.—On August 31, 1917, while en route by automobile from Mamie Lake to Woodruff, Wisconsin, I saw near Little Arbor Vitae Lake what I felt reasonably sure was a Turkey Vulture, but, in view of the locality, I was not certain

enough to record it in my field report of that year. However, on June 17, 1918, I saw one, with no doubt as to its identification, flying across the State Line—Mamie Lake road between heavy timber 1½ miles southeast of Mamie Lake.

Circus cyaneus hudsonius. MARSH HAWK.—One in brown plumage seen near Mamie Lake, August 29, 1917.

Accipiter velox. SHARP-SHINNED HAWK.—A single bird noted at Mamie Lake, June 23, 1918.

Buteo platypterus platypterus. BROAD-WINGED HAWK.—During late August, 1917, this species was probably the most common Hawk of the region. One was noted June 17, 1918, a mile southeast of Mamie Lake, and the following day a pair flew across Spring Creek, just ahead of our canoe, a short distance above Mamie Lake.

Haliaetus leucocephalus leucocephalus. BALD EAGLE.—Individual birds of this species were noted near Mamie Lake, August 27 and 29, 1917. One in immature plumage was seen perched high on a dead tree on an island in Mamie Lake, June 18, 1918. This bird was approached by canoe to within about 100 yards. The species is said to nest regularly at West Bay Lake, which lies some four miles west of Mamie Lake.

Cerchneis[1] **sparveria sparveria.** SPARROW HAWK.—One bird observed in a burned slashing near Mamie Lake, June 22, 1918. A few were noted in the region August 22, 23, and 29, the previous year.

Pandion haliaëtus carolinensis. OSPREY.—Frequently seen flying over the lakes of the region. Noted at Mamie Lake August 22, 1917, and June 13, 18 and 23, 1918.

Strix varia varia. BARRED OWL.—Two birds of this species were calling in heavy hemlock-maple woods near Mamie Lake about 5:00 P. M., August 27, 1917. The birds were distinctly heard for about 15 minutes.

Bubo virginianus virginianus. GREAT HORNED OWL.—Heard calling at Mamie Lake the evenings of August 25, 28, 29 and 30, and the morning of August 27 (5:00 A. M.), 1917, and the night of June 10, 1918. One was seen the evening of August 29, 1917, perched on the top of a tall dead white pine stub which rose high above the second-growth forest.

Streptoceryle[2] **alcyon alcyon.** BELTED KINGFISHER.—Common during both of my visits to the region, August 22 to 31, 1917, and June 6 to 24, 1918. During the latter period nesting cavities of these birds were frequently seen in cuttings through clay banks along roads, often nearly a mile from water.

Dryobates villosus villosus. HAIRY WOODPECKER. Hairy Woodpeckers were common during the last week of August, 1917, when numbers were seen, mostly in birch-aspen second-growth, but also in tamarack swamps. Others were noted June 10, 12, 21 and 22, 1918.

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[1] *Falco* of A. O. U. Check List.
[2] *Ceryle* of A. O. U. Check List.

Dryobates pubescens medianus. DOWNY WOODPECKER.—The only birds of this species noted were five or six, possibly a family group, together in thin birch-aspen woods, August 23, 1917.

Picoides arcticus. ARCTIC THREE-TOED WOODPECKER.—On August 23, 1917, the only bird of this species seen during that visit to the region was shot as it was feeding on a dead tamarack in a small tamarack-spruce bog near Mamie Lake. During June the following year they were found moderately, but locally, plentiful in the heavier timber, particularly near burns and four specimens were collected, June 13.

Sphyrapicus varius varius. YELLOW-BELLIED SAPSUCKER.—Sapsuckers were not uncommon during June, 1918, particularly in heavy timber near burns, where they were found in the same environment as the Arctic Three-toed Woodpecker. The birds were common between Palmer and Big Lakes, June 13. A nest containing young was about 50 feet up in a red pine (*Pinus resinosa*) on a point in Little Africa Lake, Michigan, June 23.

Phloeotomus pileatus abieticola. NORTHERN PILEATED WOODPECKER.—One was seen in heavy timber between Palmer and Big Lakes, June 13, 1918. The next day two others were heard and seen in a dense, almost impenetrable tamarack swamp bordering Spring Creek, near Mamie Lake.

Melanerpes erythrocephalus erythrocephalus. RED-HEADED WOODPECKER.—Apparently uncommon in the region. Two were seen in birch-aspen woods near Mamie Lake, August 22, 1917, and one, June 14, 1918.

Colaptes auratus luteus. NORTHERN FLICKER.—It can not be said that Flickers are common in the region; two were noted on August 23, one on August 26, and one, August 28, 1917. One or two were seen nearly every day from June 8 to 24, 1918.

Setochaleis[1] **vocifera vocifera**. WHIP-POOR-WILL.—Not observed by me personally, but Mr. B. R. Twombly informed me that they occur very rarely near West Bay Lake.

Chordeiles minor virginianus. NIGHTHAWK.—Seen every evening June 5 to 23, 1918.

Chaetura pelagica. CHIMNEY SWIFT.—Plentiful June 5 to 24, 1918, but noted only twice in 1917,—two birds on August 23, and several on August 26.

Archilochus colubris. RUBY-THROATED HUMMINGBIRD.—Rather common at Mamie Lake June 6 to 28, 1918. The evening of June 22 no less than five birds, one male and four females, were feeding on the honeysuckles at Bent's Camp. Only one bird was noted in 1917, that one at Bent's Camp, August 26.

Tyrannus tyrannus. KINGBIRD.—Kingbirds were common in the vicinity of Mamie Lake, June 5 to 24, 1918. They inhabited for the most

[1] *Antrostomus* of A. O. U. Check-List.

part the overflowed land where they were characteristic birds perched on the dead snags and stumps. They nested on these same snags, the nests usually being five to eight feet above water. Nests containing eggs were noted June 12 and 23.

Nuttallornis borealis borealis. OLIVE-SIDED FLYCATCHER.—Frequently seen, singly and in pairs, near Mamie Lake, June 5 to 24, 1918. This bird prefers the borders of heavy coniferous forest near burns or slashings, or along overflows near creeks. Several birds, which behaved as if migratory, were observed in cut-over land August 26 to 29, 1917.

Myiochanes virens. WOOD PEWEE.—Of regular occurrence and fairly plentiful in the heavier deciduous timber or near the border of such timber, this bird was observed daily, June 5 to 24, 1918. During the 1917 visit the bird was observed frequently August 23 to 28, but none was seen after the 28th.

Empidonax trailli trailli. TRAILL'S FLYCATCHER.—A bird of this species seen at Mamie Lake, June 11, 1918, was shot but could not be retrieved. Another was noted at Lac Vieux Desert, some 15 miles east of Mamie Lake, June 20. Both were in alder thickets.

Empidonax minimus. LEAST FLYCATCHER.—A nest of this species, containing young nearly full-fledged, was located 12 feet above ground in an aspen (*Populus tremuloides*) at Mamie Lake, August 26, 1917. The species was seen and heard in numbers daily, June 5 to 24, 1918. The birds were partial to aspen-birch thickets, although a few inhabited the heavier hemlock-maple woods. A nest containing four eggs was found 36 feet above ground in a *Populus tremuloides* near the cottages at Bent's Camp, June 9. Another nest was located 60 feet above ground (an unusual height for this species) in a hemlock, June 16.

Cyanocitta cristata bromia.[1] BLUE JAY.—During the week of August 23 to 30, 1917, these birds were common, especially at the borders of heavy hemlock-maple timber. June 5 to 24, 1918, they seemed less abundant, but were seen daily. Groups of two to five birds were frequently seen, particularly at the border of heavy timber along the lake shores.

Perisoreus canadensis canadensis. CANADA JAY.—Four or five Canada Jays were seen in the heavy timber along Spring Creek between Mamie Lake and Spring Lake, August 30, 1917. One was shot, but it was lost in the thick brush and tall grass of a tamarack swamp. June 6, 1918, a group of two adults and one young was in the second-growth woods near the border of a small, thickly-timbered tamarack-spruce swamp. Another group of two adults and two young was in mixed woods along Spring Creek, June 12. Two groups were encountered in heavy hemlock-maple-spruce timber near Spring Creek, June 15; one contained two adults and three young, the other two adults and two young. Five specimens were saved.

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[1] *cristata* of A. O. U. Check-List.

Corvus corax eurephilus. SOUTHEASTERN RAVEN.[1]—Two Ravens were distinctly seen and heard in the dense timber near Mamie Lake, June 17, 1918. I was unable to get within gun-range of them, and they were not located again. It is said by residents that this bird is more plentiful in fall and winter than in spring and summer.

Corvus brachyrhynchos. CROW.—Crows were moderately common at Mamie Lake, where a few were seen daily both during August, 1917, and June, 1918. Unfortunately I secured no specimens, and it is possible that the crow of this region may be referable to the subspecies *hesperis*.

Molothrus ater ater. COWBIRD.—Common, a number seen each day, June 5 to 24, 1918. Not observed in August, 1917.

Agelaius phoeniceus predatorius. RED-WINGED BLACKBIRD.—Several pairs of Red-wings nested in the marshes along Helen Creek, near Mamie Lake, during June, 1918, being more particularly common near the mouth of the creek. They were also found along Spring Creek more especially near the source of it, but they were not plentiful there.

Quiscalus quiscula aeneus. BRONZED GRACKLE.—Abundant in the vicinity of Mamie Lake, June 5 to 24, 1918, where they were nesting in the dead stumps and snags in overflows, usually at the mouths of creeks. The nests for the most part were two to four feet above water, but were difficult of access in our canoe on account of logs, snags and fallen timber in the water. A nest contained four recently hatched young, June 7. Only two were noted in 1917, these in paper birches in cut-over land, August 23.

Carpodacus purpureus purpureus. PURPLE FINCH.—Occasionally noted near Mamie Lake (June 7 to 9, 12, 14, 21 to 23, 1918).

Astragalinus tristis tristis. GOLDFINCH.—Common during both visits to the region, late August, 1917, and June, 1918.

Spinus pinus pinus. PINE SISKIN.—This bird was common near Mamie Lake, June 5 to 24, 1918, where it was seen daily. A large flock was frequently feeding upon dandelion seeds near the cottages at Bent's Camp. What were apparently mated pairs were seen on several occasions (June 12 and 16) in hemlock-pine woods. The testes of one bird from such a pair were well developed. The genital organs of birds from the flocks were not enlarged and did not indicate breeding activity.

Pooecetes gramineus gramineus. VESPER SPARROW.—Common in suitable habitats August 22 to 31, 1917, and June 5 to 24, 1918. Parent birds were seen carrying small green caterpillars to nestlings, June 16 and 18.

Zonotrichia albicollis. WHITE-THROATED SPARROW.—Common everywhere in slashings and burns, June 5 to 24, 1918. A few were usually present also in spruce-tamarack bogs, but rarely was one seen in heavy forest. This species was also moderately plentiful at Mamie Lake during late August, 1917.

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[1] Included in *C. c. principalis*, A. O. U. Check List.

Spizella passerina passerina. CHIPPING SPARROW.—Birds of this species were apparently rare in the region during late August, 1918, the only two noted being in second-growth, August 25. They were common June 5 to 24, 1918, particularly in open or scrubby pine woods.

Junco hyemalis hyemalis. SLATE-COLORED JUNCO.—Juncos were common, especially at the border of small spruce bogs in slashings or second-growth, June 5 to 24, 1918. A nest containing five eggs was located in a shallow excavation, somewhat overgrown with moss, in the side of a steep bank along the road near Mamie Lake, June 8. The bird sat only moderately closely, usually leaving the nest when I was within eight to ten feet of her. June 14, the nest had been robbed of its eggs and torn apart, circumstantial evidence pointing toward a chipmunk (*Eutamias minimus neglectus*). The species was not abundant during late August, 1917.

Melospiza melodia melodia. SONG SPARROW.—Common in every suitable habitat both in August, 1917, and June, 1918.

Melospiza georgiana. SWAMP SPARROW.—This species was rather common in the grassy marshes along upper Spring Creek (June 11, 17 and 22, 1918), and a few were heard along Helen Creek (June 6, 9 and 12). It was also common in the grassy marshes along the Wisconsin River, just below Lac Vieux Desert, June 20.

Pipilo erythrophthalmus erythrophthalmus. TOWHEE.—Between June 7 and 23, 1918, one or two birds were seen nearly every day. They favored the second-growth woods and slashings.

Hedymeles[1] **ludovicianus.** ROSE-BREASTED GROSBEAK.—Not common; individual birds were seen June 14, 16 and 23, 1918.

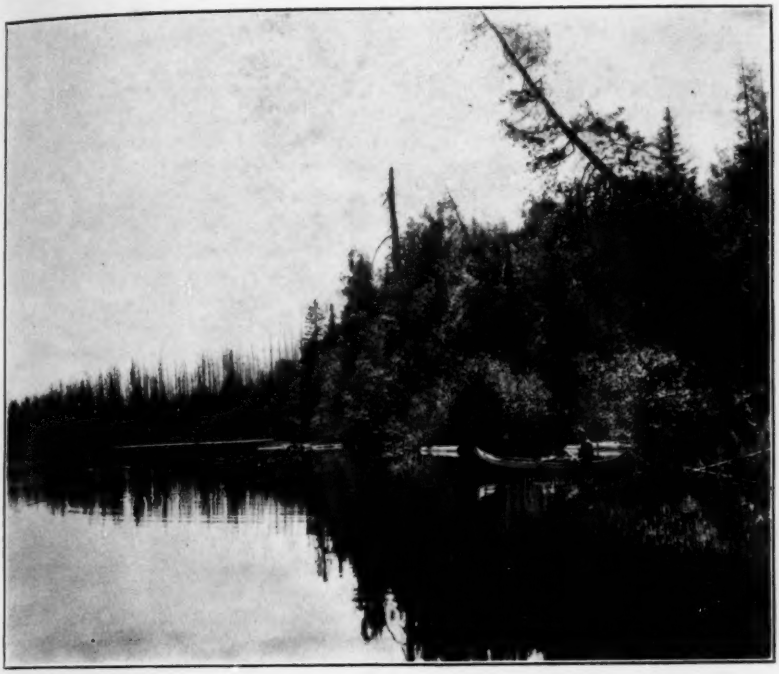
Piranga erythromelas. SCARLET TANAGER.—One or two Scarlet Tanagers were seen nearly every day (June 9 to 23, 1918). They were most often noticed near the border of the heavier timber.

Progne subis subis. PURPLE MARTIN.—This was a common bird at Bent's Camp, June 5 to 24, 1918, where it was nesting in the cornices of buildings. A few were inhabiting dead timber in overflows where it seems probable they may have been nesting. August 22 to 24, 1917, several were seen near Bent's Camp, and on August 22 others, apparently young of the year, were noted among old stubs in burnt-over timber.

Petrochelidon albifrons albifrons. CLIFF SWALLOW.—About 300 Cliff Swallows were roosting on the telephone wires at Bent's Camp August 22 to 28, 1917; on August 29, only about 40 remained; and on August 30 and 31, only six. A few birds were nesting under the eaves of a barn at Bent's Camp, June 5 to 24, 1918.

Hirundo erythrogastra. BARN SWALLOW.—Common at Bent's Camp in June, 1918, where several were nesting in the boat-houses and a few in the barn. All the nests examined (June 8, 12, 19 and 22) con-

[1] *Zamelodia* of A. O. U. Check List.



1. Spring Lake, Vilas Co., Wisc.
2. Nest of Loon (Gavia immer immer), Spring Lake, Wisc.

tained young. Two were seen flying about the cottages at Bent's Camp, August 22, 1917, and one, probably of the same birds, August 23.

Iridoprocne bicolor. TREE SWALLOW.—Common near Mamie Lake, June 5 to 24, 1918, where many were nesting in Woodpecker excavations in dead timber in the overflows. A nest containing five eggs was found in a fence post by the roadside, June 7, the entrance to the cavity being in the top of the post. The eggs in this nest hatched June 12, and the young were still in the nest the last time I examined it, June 24.

Bombycilla cedrorum. CEDAR WAXWING.—A few birds were seen every day both in August, 1917, and June, 1918. A young one, two-thirds grown, was found on the ground under a balsam tree in which was the nest, August 28.

Vireosylva olivacea. RED-EYED VIREO.—Common during both of my visits to the region.

Vireosylva gilva gilva. WARBLING VIREO.—This bird was moderately common at Mamie Lake, June 5 to 24, 1918, where they were most plentiful in second-growth woods and slashings.

Mniotilta varia. BLACK and WHITE WARBLER.—Birds of this species were evidently breeding in region, individuals being met June 8, 12 to 15, 18, 22 and 23, 1918. A male, collected June 18, had enlarged testes.

Vermivora ruficapilla ruficapilla. NASHVILLE WARBLER.—This species was confined largely to the tamarack-spruce swamps where it was not uncommon from June 8 to 23, 1918. A specimen was also collected August 25, 1917, and another bird seen August 27.

Dendroica caerulescens caerulescens. BLACK-THROATED BLUE WARBLER.—A few Black-throated Blue Warblers occur around Mamie Lake, especially at the border of spruce-cedar thickets and among birch tangles. Birds were noted June 12, 13, 16, 22 and 23, 1918.

Dendroica coronata coronata. MYRTLE WARBLER.—Four Myrtle Warblers were observed in cut-over timber at Mamie Lake, August 23, 1917, and another was seen in the same place, August 25.

Dendroica magnolia. MAGNOLIA WARBLER.—Seen only at Lac Vieux Desert, some 15 miles east of Mamie Lake, where at least three nesting pairs were located June 20, and two specimens saved.

Dendroica pensylvanica. CHESTNUT-SIDED WARBLER.—This was a common Warbler in the Mamie Lake region from June 5 to 24, 1918. In places in scrub birches at the border of heavy woods or even in slashings, the birds were abundant and their characteristic call could be heard at all hours of the day. One was seen stripping shreds from the inner bark of a yellow birch log and carrying them for nesting material, June 10.

Dendroica fusca. BLACKBURNIAN WARBLER.—This bird was common in the region, June 5 to 24, 1918, its characteristic notes being heard daily. The birds themselves were difficult to discover, staying as they did, in the tops of the higher spruces and hemlocks. They seemed to be particularly plentiful in the heavy timber east of Hardin Lake. The species was most certainly breeding, the testes of the three birds collected being greatly enlarged.

Dendroica virens virens. BLACK-THROATED GREEN WARBLER.—Frequently heard, but seldom seen, in the tops of the higher trees in birch-hemlock-maple forest (June 10 to 23, 1918). One specimen was collected, June 12.

Dendroica vigorsii. PINE WARBLER.—Locally common in the pine woods (noted June 12, 13, and 23, 1918), particularly in *Pinus divaricata* and *Pinus resinosa*.

Seiurus aurocapillus aurocapillus. OVENBIRD.—A common and characteristic bird of the forests during June, 1918. A nest containing five eggs was found in the heart of heavy hemlock-maple-birch woods between Mamie and Spring Lakes, June 8. Two birds were noted near the border of the same forest, August 25, 1917.

Seiurus noveboracensis notabilis. GRINNELL'S WATER-THRUSH.—Locally moderately common in the region, birds noted June 8, 10, 16 and 18, 1918. On June 18, this species was almost abundant among the fallen logs on the wooded, springy bank of the east side of Spring Lake.

Oporornis philadelphia. MOURNING WARBLER.—Rather common, June 8 to 23, 1918, frequenting the denser thickets, either deciduous or mixed deciduous and conifer, usually on low, damp ground. Four males were collected, all with enlarged testes.

Geothlypis trichas brachidactyla. NORTHERN YELLOW-THROAT.—A few were found in thickets of alder, dogwood, and willows in grassy marshes, June 8, 13, and 18. The birds were nowhere common, but were most plentiful near Palmer Lake.

Wilsonia canadensis. CANADA WARBLER.—Birds of this species were not uncommon, especially in the bushes near the borders of tamarack-spruce bogs. Noted June 12, 15, 16, 21 and 22, 1918.

Setophaga ruticilla. REDSTART.—A few were seen and heard in the vicinity of Mamie Lake, June 11, 12, 17, 21 and 22, 1918.

Dumetella carolinensis. CATBIRD.—A single bird was seen in hazel and birch bushes near Mamie Lake, June 19, 1918. One bird was also seen August 22, 1917, in alders near Helen Creek.

Toxostoma rufa. BROWN THRASHER.—A single bird was observed in hazel and birch bushes at Mamie Lake, June 19, 1918. Mr. B. R. Twombly tells me that a pair is found at that particular place every summer. One was seen at Lac Vieux Desert, June 20.

Troglodytes aedon parkmanii. WESTERN HOUSE WREN.—Common everywhere among fallen logs and stumps in brushy cut-over land and burns, June 5 to 24, 1918, and August 23 to 30, 1917. A nest containing young recently hatched was located 7 feet above ground in a cavity in a paper birch stump, June 22. A male, collected June 13, is easily referable to *parkmanii*.

Nannus hiemalis hiemalis. WINTER WREN.—Occasionally seen near Mamie Lake, June 12, 13, 15 and 18, 1918. One was seen in dense hemlock-maple forest, August 25, 1917. A male, the testes of which indicated breeding was collected June 13.

Sitta canadensis. RED-BREASTED NUTHATCH.—One or more Red-breasted Nuthatches were seen nearly every day from June 8 to 23, 1918. They were also not uncommon during the last week of August, 1917.

Penthestes atricapillus atricapillus CHICKADEE.—Only moderately common, June 5 to 23, 1918, when a few, usually in pairs, were seen nearly every day. From August 23 to 28, 1917, they were more plentiful and were frequently observed, particularly in birch-aspen second-growth or at the border of hemlock-maple timber.

Hylocichla guttata faxoni.[1] HERMIT THRUSH.—Fairly common at Mamie Lake, where one or two were seen daily, and where several were heard singing each morning and evening, June 5 to 24, 1918. They preferred the environs of tamarack-spruce bogs, though a few were found in birch-aspen thickets.

Turdus[2] migratorius migratorius. ROBIN.—Common from June 5 to 24, 1918. A few were seen August 23 and 25, 1917.

Sialia sialis sialis. BLUEBIRD.—Speaking relatively to other regions of similar environment in northern Wisconsin, this bird was not common in the Mamie Lake region. From 2 to 4 or 5 individuals were seen each day, June 5 to 24, 1918.

U. S. Biological Survey, Washington, D. C.

THE BIRDS OF WELLINGTON AND WATERLOO COUNTIES, ONTARIO.

BY J. DEWEY SOPER.

THE conclusions arrived at, and the notes embodied in the following annotations are the result of ten years' bird-study in the counties of Wellington and Waterloo, Ontario. The greater portion of this time was spent in the southern part of both counties, principally at Rockwood, Speedside, Guelph and Preston; and was divided into two periods—from 1908 to 1912 and 1915 to 1921. Innumerable short driving trips at all seasons radiating into nearly every part of the country north of Kitchener, Bresleau, Elora and Fergus contributed greatly to my knowledge and conception of bird problems and conditions in that additional belt. Other outings penetrated quite to the northern end of the counties, but I can by no means claim familiarity with the avifauna of the extreme northern part.

[1] *pallasi* of A. O. U. Check-List.
[2] *Planesticus* of A. O. U. Check-List.

Even with these many years residence and the greater or less familiarity with the birds of the region which it implies, I am only too conscious of the many gaps in my personal experience. It perhaps but points eloquently to the inexhaustible nature of the subject, for verily ten years, where a life time is needed, is but a humble offering. Was it not Fabre who said that that place is richest in natural history which is most studied? I have, however, used every care to represent the birds of these counties in their true relations, or to that extent at least which this time has served to make clear to me. Where I have been unable to supply data for a species from my own journals, I have quoted others whose testimony has brought the record within the prescribed region. In most instances my own independent entries are founded upon specimens which I have myself collected; those sent to me by resident friends, or those which I have mounted for local sportsmen. In each such case, of course, the evidence by virtue of its nature is unimpeachable. Where the record is not so founded on a specimen or specimens the entry is so made as to leave no question as to the quality of the statement or conclusion.

As will be readily appreciated, I have not attempted to make use of all the data pertinent to the subject at my command, which is quite unnecessary, but have contented myself with giving a brief, clear and concise statement or summary for each species in respect to relative abundance, occurrence, distribution, etc. Behind these plain statements, however, giving it abundant credence, is a wealth of amassed data covering the years above mentioned. Although knowledge and nature are their own sufficient rewards, I have always practised the systematic writing of my observations with no thought of its use beyond my purposes and satisfaction, but it has since occurred to me somewhat as a moral duty to give what I have for the use of other rising students in the counties. For this reason I have made it as complete and up-to-date as circumstances permit. I have had in mind especially the young students to whom I trust it will be of material benefit. This is the first list of birds of Waterloo county to my knowledge, and for both counties is a correlation in brief of all that is known in respect to the points which it attempts to cover. There is much new material; new records; and several added species which

now brings the avifauna of the two counties up to the grand total of 206 species.

To glimpse the extent and character of the treated region in relation to the birds, it will perhaps be well to include the following description; Wellington and Waterloo counties lie about 42 miles north of Lake Erie and 52 miles east of Lake Huron and are among those counties of the southwestern peninsula which are so nearly completely encircled by the lower system of the Great Lakes. The area of the two counties, whose outline is very irregular, is approximately 1600 square miles—the combined average length north and south being roughly 54 miles and average width east and west, 30 miles. They are drained on the north by the headwaters of the Conostoga and Maitland rivers; centrally, and in the south by the Grand River, the Speed, and its chief tributary the Eramosa. Innumerable springs give rise to a network of small streams throughout the counties. Ponds and lakes are very rare, which accounts for the relative paucity of waterfowl and waders.

The country is gently and heavily rolling accordng to locality and rises gradually towards the north where it attains a maximum elevation above sea level of 1526 feet. In the south the maximum is 1183 and minimum 895 feet respectively. It is underlain by fossil-bearing limestone of Palaeozoic age, and where it is faulted, shows as escarpments or is cut into gorges by the streams, gives rise to very picturesque and charming scenery. Notable examples are the gorges at Elora, and the gorges, caves, potholes etc., at Rockwood. The whole area in the remote past has been heavily glaciated and is characterized by the usual glacial deposits such as drumlins, till, drift, erratic boulders and long, low eskers. The region is wholly within the Transition Zone, and is agriculturally of first rank; raising abundant crops of wheat, rye, oats, barley,peas, corn, potatoes, hay, apples, pears, plums and cherries. It is also noted for its thorough-bred stock.

The region originally was densely timbered but only a tenth of the former area, I should judge, is now wooded. About forty species of trees are known to occur within the two counties, the most characteristic being: hard, soft and silver maple; white and bur oak; basswood; white and black ash; white pine; white spruce; hemlock; balsam fir; white cedar; trembling and large-toothed

aspen; balsam poplar; paper and yellow birch; ironwood; blue and common beech; red, white, and rock elm; black cherry; tamarack; black walnut; butternut; bitternut hickory, and several species of willows.

In making this paper as complete as it is, I feel deeply indebted to Prof. Klugh on whose observations I have freely drawn. His notes now, too, are of particular interest and value because compiled at a time in the history of Wellington County when the waterfowl were perhaps in greater abundance than obtains today. However, as elsewhere mentioned, the lack of lakes in this inland area has always rendered it a poor one relatively for the study of the waders and waterfowl. Prof. Klugh's notes, unless otherwise stated, have been taken from the 'Catalogue of Canadian Birds' or from his paper on the 'Birds of Wellington County;' (Ontario Natural Science Bulletin, No. 1, 1905). I have had access also, to the migration records compiled by the Wellington Field-Naturalists Club for the years 1905, 1906 and 1912.

Mr. W. E. Saunders, Mr. P. A. Taverner and Mr. C. W. Nash have assisted me more with my bird work during the past six or seven years than perhaps any of them can now readily recall, and their genial aid and inspiration is infused more deeply into the present work than is possible for anyone to know but myself. I make this acknowledgement of their generous help as a token of my long-harbored gratitude and esteem.

1. **Colymbus holboellii.** HOLBOELL'S GREBE.—I have never myself observed this species. Mr. Klugh refers to the species in Wellington County as a scarce migrant most often seen in spring. Arrives in spring about April 15.

2. **Colymbus auritus.** HORNED GREBE.—A fairly common migrant both spring and fall but more often observed during the latter season. They frequent ponds, rivers and mill dams for many days at a time. Arrives in the spring about April 15, and remains often until first week in May. Reappears in late September and lingers until mid-November. Klugh notes one individual collected as late as December 30, 1904 at Guelph. Not known to breed.

3. **Podilymbus podiceps.** PIED-BILLED GREBE.—Tolerably common migrant, arriving in spring about April 12 and in the fall by the first of October. Possibly breeds.

4. **Gavia immer.** LOON.—Scarce migrant. Occasionally observed about the last week in April, sometimes earlier.

5. **Gavia lumme.** RED-THROATED LOON.—Mentioned by Klugh as a rare migrant.

6. **Larus marinus.** GREAT BLACK-BACKED GULL.—Klugh refers to Allan Brooks as having seen three in April 1893.

7. **Larus argentatus.** HERRING GULL.—Very common spring migrant arriving about March 26. Scarce in the fall. A few in winter. The Grand River is a favorite trysting place and here in April all along its course these beautiful birds may be seen dabbling about the shores or winging up and down stream. I have seen over fifty here in a single flock standing about in shallow water. During the spring of 1916, which was unusually wet, large numbers of Herring Gulls resorted to the temporary ponds in the fields throughout the country. It was a daily sight for two weeks to see various sized flocks flying and wheeling about over the farms, even at a considerable distance from the river.

8. **Larus delawarensis.** RING-BILLED GULL.—I make this entry tentatively. On March 25, 1918, I saw four Gulls travelling northwestward near Preston, which seemed in every way to answer to this species. As McIlwraith records them as very common on the western end of Lake Ontario during the winter, and Saunders and Fleming report them breeding on Georgian Bay and Muskoka Lakes, it would be not at all improbable to expect the species to migrate across country between the two points.

9. **Sterna hirundo.** COMMON TERN.—Mentioned by Klugh as a scarce migrant.

10. **Mergus americannus.** AMERICAN MERGANSER.—Two flocks which I identified as belonging to this species flew over northwestward on March 18 and 19, 1918. Klugh does not mention them as spring migrants but does as fall migrants, stating also that they sometimes winter on the Speed River.

11. **Mergus serrator.** RED-BREASTED MERGANSER.—Referred to by Klugh as a rare migrant.

12. **Lophodytes cucullatus.** HOODED MERGANSER.—Mentioned by Klugh as a scarce migrant. I mounted a female that was shot on the Grand River October 30, 1918.

13. **Anas platyrhynchos.** MALLARD.—Occasional migrant in the spring but oftener noted about the first week in November.

14. **Anas rubripes.** BLACK DUCK.—Frequently observed as a migrant. A few breed on a series of small lakes just south of Preston. During the year of 1918, I saw odd ones in this locality in early July and a flock of seventeen on July 25. On every occasion that I visited the place I saw Black Ducks throughout August and early September. On August 19, I shot a specimen. Arrives about March 28.

15. **Nettion carolinense.** GREEN-WINGED TEAL.—Recorded by Klugh as a scarce migrant.

16. **Spatula clypeata.** SHOVELLER.—One seen by Brooks (Klugh).

17. **Dafila acuta.** PINTAIL.—Twice seen by Brooks (Klugh).

18. **Aix sponsa.** WOOD DUCK.—Klugh speaks of it as a rare migrant —once breeding in Wellington County. Arrives aaout May 1.

19. **Marila american.** REDHEAD.—Mentioned by Klugh as a frequent migrant.

20. **Marila marila.** SCAUP DUCK.—Common migrant and said by Klugh to be the commonest Duck. On May 6, 1918, I followed a wounded individual of this species about with the canoe on the Grand River. There seemed to be something wrong with one wing, but although I could approach closely, it was still able to dive exceedingly well and being without a gun it escaped me. Spring arrival about April 12.

21. **Marila affinis.** LESSER SCAUP DUCK.—Frequent migration at Mt. Forest (Klugh) passes over in the spring about mid-April.

22. **Marila collaris.** RING-NECKED DUCK.—Frequent migrant at Mount Forest (Klugh).

23. **Glaucionetta clangula americana.** AMERICAN GOLDEN-EYE.—This species is a tolerably common migrant, appearing first week in April and again about the first of November. I have frequently observed them along the Grand River, but rarely on the smaller streams. Sometimes they winter on both Grand and Speed Rivers.

24. **Charitonetta albeola.** BUFFLE-HEAD.—A frequent migrant, arriving in spring about April 15, and in the fall by October 28. Tarries often for a week or two on secluded mill-ponds, deep expansions of the rivers, and small lakes.

25. **Clangula hyemalis.** OLD-SQUAW.—Observed by Klugh as a scarce migrant.

26. **Oidemia deglandi.** WHITE-WINGED SCOTER.—Mentioned by Klugh as a scarce migrant.

27. **Oidemia perspicillata.** SURF SCOTER.—"A small flock seen at Puslinch Lake September 22, 1904, and one taken by the writer" (Klugh).

28. **Erismatura jamaicensis.** RUDDY DUCK.—Frequent migrant; arrives about April 25; and in the fall about the first week in October. Occasionally loiters about the river until early in November.

29. **Branta c. canadensis.** CANADA GOOSE.—Occurs as a frequent migrant, going over about April 10. Not so often seen in the fall. The first week in December 1920, a single individual of this species loitered about the Speed River below Guelph for several days.

30. **Botaurus lentiginosus.** AMERICAN BITTERN.—Common summer resident, breeding in many of the small marshes, ponds etc., throughout both counties. Its unique spring vocal performance is one of the characteristic sounds of rural nature through May and June. Arrives about April 25. I collected a specimen on April 5, 1918, a surprisingly early date for this species. Its crop contained ten small minnows ranging from 1½ to 2 inches in length. The stomach contained the same in a macerated condition, in addition to small gravels and many water soaked leaves.

31. **Ixobrychus exilis**. LEAST BITTERN.—Rare summer resident (Klugh).

32. **Ardea h. herodias**. GREAT BLUE HERON.—Fairly common summer resident. Nearly every stream in the country has its Blue Herons. Some years ago there was a colony about ten miles north of Rockwood. Klugh cites two colonies near Guelph some years ago, the second begun in 1903. Appears in spring about March 28, and remains until early November.

33. **Butorides v. virescens**. GREEN HERON.—Rare summer resident a number of years ago, but now fairly common in the southern part of the counties at least. Klugh mentions two which remained all summer at Puslinch Lake as long ago as 1904. I know them to breed in the south western corner of Waterloo County and in a series of small ponds west of Galt. Frequently observed along the Speed River on both sides of Guelph and are known to breed. Arrives about May 16, and leaves about September 16.

34. **Nycticorax n. naevius**. BLACK-CROWNED NIGHT HERON.—Klugh records one taken in adult plumage at Guelph about 1894.

35. **Grus mexicana**. SANDHILL CRANE.— Apparently the only occurrence on record is one cited by Klugh, as seen by Brooks in April, 1893—a single individual migrating in company with three Great Black-backed Gulls.

36. **Rallus virginianus**. VIRGINIA RAIL.—Rare summer resident. A few noted each spring about May 10, for the first. Collected a specimen on May 13, 1918.

37. **Porzana carolina**. CAROLINA RAIL.—Arrives about May 10. Rare breeders in the southern part of the counties. Klugh speaks of it as a common summer resident in the northern portion of Wellington.

38. **Coturnicops noveboracensis**. YELLOW RAIL.—Klugh records one taken in Wellington County by Mr. S. Walker.

39. **Ionornis martinica**. PURPLE GALLINULE.—One taken by Mr. Holliday near Guelph about 1894 (Klugh).

40. **Fulica americana**. AMERICANA COOT.—Scarce migrant at Mount Forest (Klugh).

41. **Philohela minor**. WOODCOCK.—Scarce migrant, appearing briefly about April 12. Klugh speaks of it for Wellington County as a scarce summer resident.

42. **Gallinago delicata**. WILSON'S SNIPE.—Scarce migrant in the southern portion of the counties. More frequently noted during the fall—late October and early November. Klugh mentions it as a scarce summer resident at Mount Forest.

43. **Limnodromus g. griseus**. DOWITCHER.—One taken by Holliday at Guelph.

44. **Pisobia maculata**. PECTORAL SANDPIPER.—Rare migrant. May be looked for about April 5. My journal for 1911 records the collection of a single specimen from a flock feeding on a ploughed field on August 24. I

cannot now find this specimen and feel disinclined at this date to accept the record as unimpeachable.

45. **Pisobia bairdi.** BAIRD'S SANDPIPER.—Rare migrant. Taken once by Mr. Holliday at Guelph.

46. **Pisobia minutilla.** LEAST SANDPIPER.—Rare migrant. Taken by Mr. Holliday at Guelph, May 19, 1895.

47. **Pelidna alpina sakhalina.** RED-BACKED SANDPIPER.—Rare migrant. Arrives in spring about May 23. Klugh records a specimen that had collided with a telegraph wire near Guelph on October 12, 1905.

48. **Ereunetes pusillus.** SEMIPALMATED SANDPIPER.—Rare migrant; has been collected by Holliday.

49. **Totanus melanoleucus.** GREATER YELLOW-LEGS.—Frequent migrant along the Grand River. Have seen several specimens collected. One shot on October 10, 1918 is now in the possession of a resident at Blair. Arrives about May 1.

50. **Totanus flavipes.** LESSER YELLOW-LEGS.—Scarce migrant. Arrives in spring about May 5.

51. **Tringa s. solitaria.** SOLITARY SANDPIPER.—Scarce migrant. Spring appearance about May 10. Probably breeds in the northern end of the counties as Mr. Saunders and I found them on two occasions in Proton Township between the sixth and ninth of August, 1920. I saw a flock of eight near Guelph, same year, on August 21. Klugh records it as common near Guelph from July 19, to September 1, 1903.

52. **Bartramia longicauda.** BARTRAMIAN SANDPIPER.—Herbert Groh of Preston records this species for the first time, in the year 1911. A pair bred and successfully reared their young. In the O. N. S. Bulletin No. 7, 1912, he says: "This record of the occurrence and breeding of the Bartramian Sandpiper near Preston appears to be the first for the district surrounding Guelph. It fails by a little of being in Wellington County, being west of Puslinch Lake nearly three miles, and distant from Guelph about eleven miles."

It is morally a Wellington County record if we but close our eyes for a moment to political boundary. Mr. Groh gives the following additional account in the O. N. S. B., No. 8, 1913: "The Bartramian Sandpiper or Upland Plover which was recorded for this locality the past two seasons has again returned in 1913 to the same neighborhood. Its cry was first heard on April 22, and frequently since. There is no evidence to indicate that more than one pair breeds here, the young reared in 1911 and 1912 doubtless going elsewhere."

53. **Actitis macularia.** SPOTTED SANDPIPER.—Common summer resident. Arrives about April 28; departs early in October. A very familiar species about ponds and streams throughout the region. I have found nests in nearly every quarter of the southern part.

54. **Pluvialis d. dominica.** AMERICAN GOLDEN PLOVER.—A rare spring migrant; more often seen in the fall but still scarce and uncertain. Has been reported to me by local gunners.

55. **Oxyechus v. vociferus.** KILLDEER PLOVER.—Common summer resident. Arrives about March 24, departs late in October. Breeds commonly throughout the region. Nest completed and eggs laid by May 27. I have found downy chicks running about as early as June 2, and others of like age as late as July 21. In 1910, I found a nest containing four eggs on April 20. The following year near the same place I found another with four eggs on April 26. Their nesting period varies widely.

56. **Charadrius semipalmatus.** SEMIPALMATED PLOVER.—A scarce migrant. Has been taken by Holliday at Guelph. Arrives about May 15. I collected a specimen at Speedside on May 17, 1910.

57. **Colinus v. virginianus.** BOB-WHITE.—Formerly occurred in the southern part of the counties as I have time and again been told by old residents. Has been exterminated for at least twenty years. Klugh records one seen by Brooks for Wellington Co.

58. **Canachites canadensis canace.** CANADA SPRUCE GROUSE.—Klugh records the Canada Grouse being once taken near Guelph on November 25, 1898.

59. **Bonasa umbellus togata.** CANADA RUFFED GROUSE.—Fairly common permanent resident. They begin to lay about mid-April. I have several times seen downy young about the first of June. On May 6, 1920, I found a nest in a thick cedar swamp near Guelph containing fourteen eggs. The young hatched late in May.

60. **Ectopistes migratorius.** PASSENGER PIGEON.—Once abundant but now extinct.

61. **Zenaidura macroura.** MOURNING DOVE.—Tolerably common summer resident. Arrives about April 15. Departs about October 20. The Wellington Field Naturalists Club records one seen in 1905 as early as March 25, and as late as November 3. One of the characteristic sounds of the April and May woods is the soft and mournful cooing of this species. On June 30, 1915, I found a nest containing one egg. It was a flimsy structure of interlaced twigs planted on the top rail of a snake fence thickly overhung with cedars.

62. **Cathartes aura septentrionalis.** TURKEY VULTURE.—Klugh records one taken in Wellington County, September, 1910.

63. **Circus hudsonius.** MARSH HAWK.—Common summer resident in the south. Klugh mentions it as a scarce resident at Mount Forest. Arrives about April 5. I have one record as early as March 18, in 1918. Leaves in late October. W. F. N. Club records one for November 8, in 1905. A nest found on May 17, 1918 contained five eggs. Young hatched out on June 6.

64. **Accipter velox.** SHARP-SHINNED HAWK.—Scarce summer resident. Arrives about April 8, although sometimes ten days earlier. Leaves sometime in October. Klugh records it as a common summer resident at Mount Forest.

65. **Accipter cooperi.** COOPER'S HAWK.—Scarce summer resident. Arrives early in April. Occasionally remains throughout the winter.

I have myself seen it more frequently during the winter than the summer. On December 12, 1914, I was within a few feet of a Cooper's Hawk in the city of Guelph as it pursued a flock of English Sparrows around a small barn. Took a specimen near Rochwood about February 10, 1917, as it was manoeuvering around a barnyard. Specimen now in collection of Geological Survey, Ottawa. A specimen in my collection was shot in the woods north of Preston on January 15, 1918, (No. 234). I know of but one nesting record, a brood of young which I saw out of the nest just south of Preston in an oak woods early in August, 1918.

66. **Astur a. atricapillus.** AMERICAN GOSHAWK.—Irregular winter visitor. Sometimes fairly frequent and again entirely absent. Generally a few are observed or shot during the fall as they make themselves conspicuous about farm yards, often openly attacking poultry. I mounted a specimen, which was shot on October 27, 1916, while in the act of flying upwards with a good sized chicken which it had seized.

67. **Buteo b. borealis.** RED-TAILED HAWK.—Scarce migrant at Guelph; very rare at Mount Forest (Klugh). Arrives about March 15.

68. **Buteo l. lineatus.** RED-SHOULDERED HAWK.—Common summer resident. Arrives about March 19, and departs early in October. I have a number of nesting records. I collected a breeding male on May 8, 1917, which is now in the Geological Survey collection.

69. **Buteo platypterus.** BROAD-WINGED HAWK.—Frequent migrant, arriving about April 24, and again observed in late September. I believe a few breed, as I collected a male in a thick swamp on May 21, 1915 —No. 33,—now in collection of Geological Survey. This supposition is in no way improbable when it is remembered that the species breeds in Ontario on an average about May 24, and has been known to have eggs as early as May 8.

70. **Archibuteo lagopus sancti-johannis.** AMERICAN ROUGH-LEGGED HAWK.—Rare migrant. W. F. N. Club records an individual for Wellington on October 31, 1905.

71. **Haliaeetus leucocephalus alascanus.** BALD EAGLE.—Rare migrant. (Klugh). W. F. N. C. records one May 2, 1905.

72. **Falco islandus** WHITE GYRFALCON.—Rare. One seen by Brooks in February, 1893.

73. **Falco. c. columbarius.** PIGEON HAWK.—Scarce migrant. (Klugh). W. F. N. C. records one October, 15, 1905

74. **Falco s. sparverius.** SPARROW HAWK.—Common summer resident. Arrives by April 5, occasionally a week earlier. Leaves early in October.

75. **Pandion haliaëtus carolinensis** AMERICAN OSPREY.—Infrequent migrant. A specimen in Preston was shot nearby on the Grand River. W. F. N. Club records one ov September 30, 1903; April 22, and September 28, 1905.

76. **Asio wilsonianus** AMERICAN LONG-EARED OWL.—Rare resident. (Klugh). This species is so retiring by nature, that it is perhaps a much more frequent migrant and breeder than is supposed.

77. **Asio accipitrinus.** SHORT-EARED OWL.—Rare migrant (Klugh).

78. **Syrnium varium.** BARRED OWL.—This species is a rare resident in the region and scarce at Mount Forest. I know of a specimen in Preston which was shot in the month of September, 1916, near Blair.

79. **Cryptoglaux r. richardsoni.** RICHARDSON'S OWL.—One taken by Brooks in Wellington County, (Klugh).

80. **Cryptoglaux acadica.** SAW-WHET OWL.—Probably a frequent migrant, but a scarce summer resident. Has been taken by Holliday.

81. **Otus a. asio.** SCREECH OWL.—Common resident. It is most noticeable during the fall and a common thing at that time to hear their weird screeching calls on clear nights coming from the woods. I have seen them on many occasions throughout the year, but most frequently in barns during the winter. Klugh remarks that the gray phase predominates at Guelph, red at Elora, and gray at Mount Forest.

82. **Bubo v. virginianus.** GREAT HORNED OWL.—Common resident throughout both counties. I have flushed this species in thick woods nearly every month in the year and collected several specimens. It is a frequent experience to see the Crows in the spring mobbing the Horned Owl. There was a heavy migrational wave of this species in November, 1918, when it was not uncommon to see several on a single walk. They sat listlessly about in the weak sunshine, openly exposed on the limbs of beech and maple. Nests late in March. In a female that I collected on March 21, 1918, the ovaries were about the size of No. 6, shot.

83. **Nyctea nyctea.** SNOWY OWL.—Very irregular in its movements. Occasionally observed during severe winters. I have seen two or three mounted specimens in the counties which were shot during a noted southern movement of the species about 1901–02.

84. **Surnia ulula caparoch.** AMERICAN HAWK OWL.—Rare winter visitant at Mount Forest (Klugh).

85. **Coccyzus a. americanus.** YELLOW-BILLED CUCKOO.—Scarce summer resident. Recorded once by W. F. N. C. on May 12, 1905.

86. **Coccyzus erythrophthalmus.** BLACK-BILLED CUCKOO.—Common summer resident. Arrives about May 25 and disappears in late September. Young are hatched from June 15 until well into July. I have seen them feeding young just from the nest on July 11.

87. **Ceryle a. alcyon.** BELTED KINGFISHER.—Common summer resident. Appears about April 10. Normally disappears in November. I have myself seen them on the Speed River near Guelph until December 7, 1920. Occasionally winter on the Speed and Grand Rivers.

88. **Dryobates v. villosus.** HAIRY WOODPECKER.—Frequent resident. According to my experience they are commoner in Wellington than Waterloo. Have collected specimens on March 6, 1917, and June 14, 1915. More frequently met during fall and winter.

89. **Dryobates pubescens medianus.** DOWNY WOODPECKER.—Fairly common resident; most noticeable during the spring.

90. **Picoides arcticus.** ARCTIC THREE-TOED WOODPECKER.—Rare visitor at Guelph. One taken May 2, 1904 by the writer. One taken by Brooks at Mount Forest in October, 1893; others seen there (Klugh). Recorded by W. F. N. C. on May 1 and 2, 1905.

91. **Sphyrapicus v. varius.** YELLOW-BELLIED SAPSUCKER.—Common migrant, arriving about April 12. Scarce summer resident. Last seen in late September.

92. **Phloeotomus pileatus abieticola.** NORTHERN PILEATED WOODPECKER.—Rare. The only record I have is an individual that I saw in pine woods near Blair on March 28, 1915.

93 **Melanerpes erythrocephalus.** RED-HEADED WOODPECKER.—Fairly common summer resident. Arriving about May 6. Saw one on April 13, 1918. Klugh records Mr. A. A. Davidson finding twenty-six in a swamp at Elora in February, 1899.

94. **Colaptes auratus luteus.** NORTHERN FLICKER.—A very common summer resident, appearing in spring about April 10. Leaves early in October. Young are hatched about June 1, and leave the nest three weeks later. Rarely remains all winter in thick woods if the season is favorable.

95. **Antrostomus v. vociferus.** WHIP-POOR-WILL.—Tolerably common summer resident. Arrival about May 5; departs early in September.

96. **Chordeiles v. viginianus.** NIGHTHAWK.—Common summer resident. Arrives about May 20, leaves early in September.

97. **Chaetura pelagica.** CHIMNEY SWIFT.—Common summer resident, arriving about April 28; departing early in September, or late August. Eggs laid by June 17 and young about ready to leave the nest by July 28.

98. **Archilochus colubris.** RUBY-THROATED HUMMINGBIRD.—Frequent summer resident. First seen about May 18. Disappears about September 25. Breeds in the middle of June. Two nests which I have seen were built on the limbs of poplars surrounding an orchard near Speedside.

99. **Tyrannus tyrannus.** KINGBIRD.—Very common summer resident. Arrives about May 8. Departs early in September. Nest completed and eggs laid by June 10. Young ready to leave the nest about July 24.

100. **Myiarchus crinitus.** CRESTED FLYCATCHER.—Common summer resident. First observed about May 10; leaves in mid-September. Breeds in late May to early June.

101. **Sayornis phoebe.** PHOEBE.—Common summer resident, arriving April 1; departing about the middle of October. Males precede females by several days. Eighteen days after female arrives the nest is usually completed, and by May 6, the full clutch of eggs laid. Young leave the nest about June 12. Probably a second brood is often raised as I have seen young just from the nest on July 23.

102. **Nuttallornis borealis.** OLIVE-SIDED FLYCATCHER.—Klugh mentions the species as a rare migrant at Guelph and a frequent summer resident at Mount Forest.

103. **Myiochanes virens.** WOOD PEWEE.—Common summer resident. First observed about May 17, leaves about September 15. Breeds in mid-June; young leave the nest early in July.

104. **Empidonax flaviventris.** YELLOW-BELLIED FLYCATCHER.—Scarce migrant. Arrives about May 19. On May 20, 1916, I collected a specimen which was frequenting bushes over a small pond in the woods. Reported as a common summer resident at Mount Forest by Klugh.

105. **Empidonax t. trailli.** TRAILL'S FLYCATCHER.—"Scarce at Mount Forest. Specimens were sent by Brooks to Wm. Brewster who pronounced them ultra-typical of the subspecies. Brooks says that this is a bird of the dry upland copses of small maple, beech, etc., while *E. t. alnorum* inhabits the swales. The notes are quite distinct from those of *alnorum*." (Klugh).

106. **Empidonax trailli alnorum.** ALDER FLYCATCHER.—Fairly common migrant and frequent summer resident. Arrives very regularly about May 24, and appears to leave early in September. I collected a specimen north of Preston on May 24, and two on June 6 following, 1916. Their notes are very distinctive, sounding like *twa-che-a*, with the accent on the second syllable, and cannot be mistaken for any other species. I have heard them nearly every year, especially during late May. I knew of two resident pairs near Guelph in the summer of 1920. They frequented wet depressions of swamp land grown to cedar, tamarack, willow etc., and were very shy and seclusive.

107. **Empidonax minimus.** LEAST FLYCATCHER.—Tolerably common summer resident frequenting woodland, particularly, of trembling and large-toothed aspen and balsam poplar. Occasionally nests in apple orchards. Arrives about May 6. The song is an emphatic *che-bec*, markedly dignostic of the species and therefore easily distinguished. I collected a female on May 27, 1915. Produces its eggs about the first of June.

108. **Otocoris alpestris praticola.** PRAIRIE HORNED LARK.—Common summer resident. Usually the first species to arrive in the spring, reaching us in late February or early March as a rule, enlivening the frozen ploughed fields with their rattling, pebbly songs. They leave about November 10. On May 5, 1915, I found a nest in a meadow containing four eggs. A young one apparently just from the nest was found on May 18, 1917. Of the many specimens which I have collected in the two counties all have proven to be *praticola*.

109. **Cyanocitta c. cristata.** BLUE JAY.—Common resident; markedly abundant during the fall when the woods resound with their loud brazen calls. Frequently at this time they travel about in small bands of from three to five. Nests about the middle of May. One pair that I watched building on May 2, 1915, went about their work with unbroken silence, save for a few low *crooks*, as they approached each other near the nest. The latter was situated on a limb of a tall white pine about twenty feet from the ground.

110. **Perisoreus c. canadensis.** CANADA JAY.—"Frequent from October 24, to November 17, 1904, in Wellington County" (Klugh)

111. **Corvus b. brachyrhynchos.** AMERICAN CROW.—Very common summer resident, arriving about February 25. Congregate in great flocks October 5 to 25 and leave soon after. An odd straggler remains often far into November and even December. They are very scarce winter residents. Eggs are laid by about May 10 and young out of nest by June, 12.

112. **Dolichonyx oryzivorus.** BOBOLINK.—This sweet rollicking resident of clover-fields and meadows arrives with wonderful regularity about May 5, each year. Vanishes toward the middle of August. Lays eggs in mid-June. A second brood appears to be raised in July. I have seen well-grown juveniles arrayed on wire fences between August 7 and 10.

113. **Molothrus a. ater.** COWBIRD.—Common summer resident. Appears about March 25 and leaves early in October. The young hatched and reared by other species of small birds leave the nest the forepart of June. The males frequently band together in small flocks by the last of June.

114. **Agelaius phoeniceus phoeniceus.** RED-WINGED BLACKBIRD.—Fairly common summer resident. First seen about March 20; the majority disappearing by mid-September. An odd one lingers on somewhat longer. In the migration records of the W. F. N. Club is the entry of a "last seen" on November 3, 1912. Full compliment of eggs is laid by about May 22, and the young have left the nest by June 17. Young of a second brood, apparently, are often observed about August 2.

115. **Sturnella m. magna.** MEADOWLARK.—Common summer resident. Arrives about March 20, occasionally as early as the 13th. There is a little flocking tendency often in early August. The majority of the birds are gone by mid-October. Many remain into November. W. F. N. C. records one on December 3, 1905. Breed in early May and young have vacated nest by June 10–16.

116. **Icterus galbula.** BALTIMORE ORIOLE.—A common summer resident of door-yard trees and orchards everywhere. Arrival about May 10; departure about September 1.

117. **Euphagus carolinus.** RUSTY BLACKBIRD.—Not very common as a spring migrant. Arrives about April 10. Sometimes not seen at all during the spring but usually a common fall migrant, appearing in late September and lingering for a couple of weeks.

118. **Quiscalus q. aeneus.** BRONZED GRACKLE.—A very common summer resident in certain localities. Appears from March 18 to 28, leaves by the 20th of October. I have known a few to remain along the Speed several days later than this. Breeds in the forepart of May, eggs hatched by about May 28, and young able to fly by June 20. They sometimes flock as early as July 6 and by August 20, the movement is very pronounced, huge flocks driving over towards evening in every direction from day to day. There is a characteristic fall element in these late August aggregations.

119. **Hesperiphona v. vespertina.** EVENING GROSBEAK.—Rare winter visitor. Occasionally during a severe winter these beautiful northerners make their way into the south. A few were observed during the winter of 1919–20. Klugh mentions the species as seen in considerable numbers during February, 1902—a flock of 75 being seen on the 6th of that month by Prof. M. W. Doherty.

120. **Pinicola enucleator leucura.** PINE GROSBEAK.—This species is an irregular winter visitor, some seasons being tolerably common. During the winter of 1910–11 they were frequent callers in our orchard, where they fed for a period almost daily on thero tten frozen apples which still clung to the limbs. On February 16, 1917, I saw a single female; also single birds on October 20, 1918, and January 5, 1919, Klugh records them for the winter of 1903–04 from November 5, until March 24.

121. **Carpodacus p. purpureus.** PURPLE FINCH.—Fairly common spring migrant. An infrequent summer resident and very often a winter resident. I have seen them every month in the year within the counties. They are particularly noticeable during April, for then they flock together and the males are in full song. Small flocks are occasionally seen frequenting conifers in heavy woods during the winter.

122. **Loxia curvirostra minor.** AMERICAN CROSSBILL.—Irregular winter visitor (Klugh).

123. **Loxia leucoptera.** WHITE-WINGED CROSSBILL.—Irregular winter visitor. Observed a small flock in a hemlock wood near Speedside in December, 1910.

124. **Acanthis l. linaria.** REDPOLL.—Common winter visitor. Very numerous during the winters of 1911–12 and 1916–17. One of the largest flocks I ever saw flew into some apple trees in an orchard near Preston on March 9, 1917. There were at least four hundred in the gathering and they literally darkened the trees. On March 30 following I saw a flock of about one thousand in an open field. Of numerous specimens taken all were *linaria*.

125. **Astragalinus t. tristis.** AMERICAN GOLDFINCH.—Common summer resident; scarce winter resident. Make their appearance in summer plumage about May 6, when they are of course more noticeable. On November 26, 1917, I collected a specimen in winter plumage from a flock of about fifty. Have seen them in flocks frequenting thick cedar woods in December. Saw a flock in winter plumage on March 3, 1918. On April 18, following, I observed a small flock feeding on the ground about little pools among the hardwoods. The males were then arrayed in their distinctive summer livery. The Goldfinch is a relatively late breeder, nesting in July and August. The earliest birds are out of the nest about July 20, and others are considerably later. The males are particularly voluble about August 18. For three weeks a number of Goldfinches sang lustily day after day about a row of lofty white spruces during August. The male launches out from one tip to another on rapidly

beating wings, singing in the most ecstatic manner. The whole performance is frequently prolonged into a wide circling flight accompanied by a continuous wild overflow of song. The females were doubtless incubating in the spruces, or tending young. After August 24, the young were much in evidence in the vicinity calling incessantly in tones resembling *chee heep* or *chee he heep*. Were it not for the sweet quality of the calls, the persistency of the numerous performers would render the air after a time rather monotonous.

126. **Spinus p. pinus.** PINE SISKIN.—A very irregular winter resident. My own record of the species is very meagre. I observed them commonly during the winter of 1910–11 and they were tolerably common in 1914–15. Not many were seen during January and February, 1915, but the records show them to be in fair evidence during the last half of March and for a few days in early April. The W. F. N. Club records them on March 29, and November 1, 1905, and in January 1906. That year they are recorded as breeding commonly in the vicinity of Guelph.

127. **Plectrophenax n. nivalis.** SNOW BUNTING.—This species is observed nearly every winter; arriving about November 15 and disappearing commonly towards the end of March, usually by the 17th. Some winters these Buntings are quite numerous, banding in large sociable flocks and are to be seen sweeping up and circling above the snowy fields or settling among the weed-tops to feed. During severe weather in January it is not unusual to see them feeding among chaffy refuse which the farmers have thrown out on the gangways in front of the barns. At such times they are not very shy.

128. **Calcarius l. lapponicus.** LAPLAND LONGSPUR.—Rare winter visitor (Klugh).

129. **Pooecetes g. gramineus** VESPER SPARROW.—A very common summer resident. Appears in spring by April 5, and leaves about October 24, They show a marked tendency to flock in small bands late in September. Abundant breeders in early June, an odd nest containing young by June 11. I have seen young awing on June 13. Some are earlier, but the majority later.

130. **Passerculus sandwichensis savanna.** SAVANNAH SPARROW.—A common summer resident. Arrives about April 13; leaves late in September. It nests in May, June and July.

131. **Ammodramus savannarum australis.** GRASSHOPPER SPARROW.—Before me as I write is a specimen of this Sparrow constituting as far as I know the first record for either county. I collected this bird four miles north of Preston in Waterloo County, on June 14, 1917—catalogue No. 180. It was frequenting a hay meadow such as is used by Bobolinks and Meadowlarks. It seemed very shy and only after considerable stalking did I finally come within range. I was attracted to it by its song which I recognized at once as a strange one to me. The year before I heard the same, but failed to secure a specimen. It appealed to me as resembling the syllables—*chu-chuc-che*—rapidly repeated and forming a

single delivery. On June 20, 1919, I again discovered the species on a low meadow not a mile distant from the spot where I collected my 1917 specimen. The species is evidently increasing its range northwards in Ontario. Mr. Saunders says of it in Macoun's 'Catalogue of Canadian Birds' published in 1909; "Fairly common in the two southwestern counties of Ontario: increasing steadily in numbers in the London district. I now meet it every year and sometimes locate five or six pairs in a single season though I have not yet found a nest." This is a fore-shadowing of their ultimate appearance in Waterloo County several years later.

132. **Zonotrichia l. leucophrys.** WHITE-CROWNED SPARROW.—Frequent spring migrant, less common in fall. Dates of spring arrivals in the counties run from as early as April 28 to as late as May 25. These two extreme dates are those from the migration records of the W. F. N. C. At Speedside in 1910 I saw one on May 2, saw and heard one singing on the 13, and another on the 21. Saw a single individual the following year on May 13. Collected a male on May 8, 1916, and again observed a single bird only on May 21, 1917. The W. F. N. C. observes the species on September 22, 1905. On October 3, 1920, I saw two White-crowns in company with Song, White-throated and Swamp Sparrows; the company was frequenting a tangled thorn hedge by the side of a field near a swamp. I heard the White-crowns twice whistle their entire songs but much subdued. A number of additional "part-songs" were also heard when the singer in modest undertones sang correctly the forepart of the melody, but broke off abruptly before the proper ending.

133. **Zonotrichia albicollis.** WHITE-THROATED SPARROW.—Common summer resident. Arrives about April 25. My earliest record is April 15, 1921; the W. F. N. Club has an entry for April 5, 1906. They tend to band together and with other Sparrows late in September and early October. They finally disappear about September 15, although an occasional bird may be seen several days later. Nests in late May and in June.

134. **Spizella m. monticola.** TREE SPARROW.—Frequent winter resident. Sometimes common, other winters apparently absent. They appear early in November, and are sometimes to be seen in abundance as early as October 18. They disappear about April 20.

135. **Spizella p. passerina.** CHIPPING SPARROW.—Common summer resident. Arrives about April 15, occasionally as early as April 8. Leaves about October 14. The nest completed and eggs laid by late May. Young are full fledged by June 12. I have seen young in the nest as late as August 2. Many doubtless raise a second brood.

136. **Spizella p. pusilla.** FIELD SPARROW.—Recorded by the Wellington Field-Naturalists' Club on 1912 between May 3 and 7. Again seen in 1919 by Prof. Crow near the Ontario Agricultural College, Guelph. The bird is very rare.

137. **Junco h. hyemalis.** SLATE-COLORED JUNCO.—Abundant migrant. Breeds sparingly. Spring migration reaches the counties about March 15; in 1920 it was five days earlier. They are common for sixweeks,

then all gradually disappear but the very few that remain to breed. Found nests in late May of years 1909 and 1911. The species again becomes abundant about October 3, reaching the high tide in ten days and gradually thinning out and disappearing again towards the end of the month. Small parties are sometimes to be seen even into the middle of November. An occasional bird winters.

138. **Melospiza m. melodia.** SONG SPARROW. — Abundant summer resident. Arrives about March 18; departs about October 23. Eggs are produced as early as April 29 and still laid as late as early August.

139. **Melospiza georgiana.** SWAMP SPARROW. — Common summer resident. First noted about April 16; last seen about October 10. A nest found on May 14, 1911, contained two eggs; when next visited on the 21st of the month it contained five. On June 17, the nest was empty.

140. **Passerella i. iliaca.** FOX SPARROW. — This bird is a scarce migrant; very rarely seen in spring but commoner during the fall migrations. Twice noted it at Speedside in October, 1910 and 1911. Saw a pair of Fox Sparrows a few miles north of Preston in hardwoods on April 7, 1918. W. F. N. Club records the species on September 27, 1906; and April 23 and October 28 to November 5, 1905.

141. **Pipilo e. erythrophthalmus.** TOWHEE. — Tolerably common summer resident. Quite common during spring migrations, showing up first about April 8 and are numerous by May 6. Leaves about October 10. I heard the familiar nasal, *swape* call of this species on October 22, 1920. It was, however, a very mild season; a long spell of weather during the month being as mild and languid as August, inducing the species to remain longer. On November 7, of the same fall I saw a Towhee in Muskoka along the Moon River; an unusual date—the mild season again being responsible. A nest which I found near Preston on June 30, 1918 contained four slightly incubated eggs.

142. **Cardinalis c. cardinalis.** CARDINAL. One taken at Salem, near the middle of Wellington county January 3, 1898. One seen at Guelph December 20; 22; and 27, 1898, by F. N. Beattie (Klugh).

143. **Zamelodia ludoviciana.** ROSE-BREASTED GROSBEAK. —Frequent summer resident. Arrives about May 10, and leaves in late August. Breeds in late May.

144. **Cyanospiza cyanea.** INDIGO BUNTING.—Common summer resident. Appears about May 18 and leaves early in September.

145. **Piranga erythromelas.** SCARLET TANAGER. —Tolerably common summer resident. Spring arrival about May 15; departure about September 10.

146. **Progne s. subis.** PURPLE MARTIN. —Mr. Klugh says in 'Catalogue of Canadian Birds,' 1909: "A few breed in the cities, and an odd pair in some of the villages around Guelph; arrives about May 10 and leaves about August 1" The species has evidently become very rare of late years as I have never seen it in either county.

147. **Petrochelidon l. lunifrons.** CLIFF SWALLOW.—Frequent summer resident, but very local in distribution. Arrives about May 17, and leaves in late August. Several pairs bred on our barn during June and July 1915 in Waterloo County.

148. **Hirundo erythrogastra.** BARN SWALLOW.—Common summer resident. Makes its appearance about April 25; departs September 5–8. Nest completed and eggs laid by the end of May. Young are awing early in July. Two broods are frequently raised.

149. **Iridoprocne bicolor.** TREE SWALLOW.—Common summer resident, arriving about April 23 and leaving in late August and early September. Breeds in late May and in June. Two nests which I found in early June in Waterloo County, were located in the tops of decayed fence posts.

150. **Riparia riparia.** BANK SWALLOW.—Not an uncommon summer resident but very local. I have seen the species in different parts of the counties but most frequently along the Grand River where they nest in colonies in sand banks. Arrives early in May and leaves sometime during the latter half of August. Breeds in late May and in June.

151. **Stelgidopteryx serripennis.** ROUGH-WINGED SWALLOW.—It is difficult to be sure just how plentiful this species really is on account of its similarity to the Bank Swallow. Certainly it has been frequently overlooked. I have several times observed the species associating with Bank Swallows in the southern part of the counties, and most frequently along the Grand River in Waterloo County. On May 13, 1916, I collected a male from a colony of mixed Banks and Rough-wings, near Freeport on the Grand River. Arrives about May 2, and leaves in late August.

152. **Bombycilla garrula.** BOHEMIAN WAXWING.—Once observed by Prof. Crow near the Ontario Agricultural College at Guelph.

153. **Bombycilla cedrorum.** CEDAR WAXWING.—Common summer resident. Arrives about May 26; leaves about September 24. Some times unusually common in early June. They breed about June 10, and the young are on the wing by July 1. Some birds are very late builders. I have seen them nest building on July 10; eggs in the nest on July 23 and young still in the nest on August 6.

154. **Lanius borealis.** NORTHERN SHRIKE.—Scarce winter visitor (Klugh).

155. **Lanius ludovicianus migrans.** MIGRANT SHRIKE.—Scarce summer resident. Arrives about March 20, and leaves early in September.

156. **Vireosylva olivacea.** RED-EYED VIREO.—Common summer resident. Arrives about May 12, and leaves about September 25. Breeds in June.

157. **Vireosylva philadelphica.** PHILADELPHIA VIREO.—"Rare migrant. One taken by Brooks in May 1894; one by writer August 27, 1903, and another September 6, 1904" (Klugh).

158. **Vireosylva g. gilva.** WARBLING VIREO.—Common summer resident. Arrives about May 6, leaves in the latter part of September. A nest that I found near Blair on June 25, was in a big maple twenty-five feet up and contained four eggs.

159. **Lanivireo flavifrons.** YELLOW-THROATED VIREO.—Uncommon migrant usually; occasionally numerous during the spring migrations. First seen about May 9. Again observed about mid-September, often earlier. My latest record of the species is for one seen near Guelph on October 10, 1920. It was travelling in company with Ruby-crowned Kinglets and Myrtle Warblers. It will be remembered that the fall of 1920 was one of exceptional mildness, which doubtless retarded the southern movement.

160. **Lanivireo s. solitarius.** SOLITARY VIREO.—Scarce migrant. Arrives about May 8. Again observed from about September 10, until early October. I once collected a specimen near Preston as late in the spring as May 17. The last have normally passed on days before this date.

161. **Vireo g. griseus** WHITE-EYED VIREO.—One taken at Mount Forest on September 28, 1902, by Howard Scales (Klugh).

162. **Mniotilta varia.** BLACK AND WHITE WARBLER.—Common summer resident. Arrives about May 3, leaves about the middle of September. W. F. N. Club records the species as late as the 22nd of the month.

163. **Vermivora r. ruficapilla.** NASHVILLE WARBLER.—Abundant spring migrant. Arrives about May 10, and leaves about September 25. A few remain and breed. In the years 1915–16, north of Preston, I knew of the presence of Nashville Warblers through June, July and August which certainly bespeaks the breeder although I was never able to find a nest. All through June and July of 1920 I knew where to find a pair of Nashvilles in a bit of swamp land near Guelph. On one or two occasions one of the birds persistently carried about a green worm and was much disturbed over my presence. The nest was undoubtedly near, but my best efforts failed to discover it.

164. **Vermivora peregrina.** TENNESSEE WARBLER.—Included in the Wellington list by Klugh as a scarce migrant. I have completely overlooked the species myself.

165. **Compsothlypis americana usneae.** NORTHERN PARULA WARBLER.—Tolerably common migrant. Appears about May 12, and again observed in early September. Some years very scarce, and even apparently entirely absent. More common during the spring.

166. **Dendroica tigrina.** CAPE MAY WARBLER.—A rare migrant. Klugh records the taking of three specimens in the fall of 1904.

167. **Dendroica a. aestiva.** YELLOW WARBLER.—Common summer resident. Arrives about May 5, leaves about August 20. The most abundant of the Warblers. In June one seems to meet them everywhere. Breeds early in June.

168. **Dendroica c. caerulescens.** BLACK-THROATED BLUE WARBLER. —Some years not an uncommon migrant, arriving about May 15. Occasionally breeds, leaving about the middle of September. Certainly less common during the fall. Some years I have failed to record it at all.

169. **Dendroica coronata.** MYRTLE WARBLER.—A very common Warbler in early spring some years; April 25 until about the middle of May. The first of our Warblers to arrive. In 1917 they commenced to appear on April 24, which was then fine weather. Then it turned raw and cold and the next bird seen was on May 21, and on May 25 my journal says "they were trooping through the woods in great bands every where to be seen." Breeds rarely. Fall migration first shows up about October 2; are common by the 10th and disappear about October 18.

170. **Dendroica maculosa.** MAGNOLIA WARBLER.—A moderately common migrant, arriving May 10 to 24; again observed for a couple of weeks in mid-September. W. F. N. C. records the species as a rare breeder in 1905–06.

171. **Dendroica pensylvanica.** CHESTNUT-SIDED WARBLER.—Common spring migrant; a few breeding every year. Arrives about May 8; leaves early in September. Breeds early in June.

172. **Dendroica castanea.** BAY-BREASTED WARBLER.—Usually not a common spring migrant, but some years, such as in 1915, quite common or even abundant. On May 27, after a period of windy days and cold nights, I went to the woods about 5:30 A. M. and the Bay-breast's were flitting about everywhere in the shrubbery. The morning was warm and bright and seemed to give impetus to migration, for all species were very active, and Warblers of several species were swarming about in abundance. On the other hand, some seasons go by without seeing them at all. Frequently seen again in early September, some years more common then than during the spring.

173. **Dendroica striata.** BLACK-POLL WARBLER.—Scarce spring migrant; more common in fall. Arrives about May 27 and is again noted during the forepart of September. The W. F. N. Club records the latest date seen in 1905 as September 27.

174. **Dendroica fusca.** BLACKBURNIAN WARBLER.—Moderately common migrant, arriving about May 10, and again noted during the last of August and early September. Breeds very sparingly.

175. **Dendroica virens.** BLACK-THROATED GREEN WARBLER.—Abundant during migrations and a fairly common summer resident. Arrives about May 2 and as early some years as April 25. Leaves late in September. Breeds throughout the month of June.

176. **Dendroica vigorsi.** PINE WARBLER.—"Rare migrant. Seen on April 28, 1896 by P. A. Taverner" (Klugh).

177. **Dendroica p. palmarum.** PALM WARBLER.—A scarce migrant. First observed about May 6 and again noted from about September 15, until early October. The Wellington Field-Naturalists' Club recorded the

species in 1912 as late as October 13. On May 3, 1915, I collected a specimen north of Preston in a swamp of spruces, birch, tamarack, etc.

178. **Seiurus aurocapillus.** OVENBIRD.—Common summer resident. Arrives about May 5, and in a day or two is very numerous. In ten days it is less common as the migration wave subsides. Leaves about September 25. My latest record is for October 3, 1920 near Guelph. Breeds in June; my earliest date is for a nest of four eggs is June 5, 1915.

179. **Seiurus n. noveboracensis.** WATER-THRUSH.—Moderately common summer resident. Notably common during the spring migration when his wild, ringing song may be heard from every swamp-land. Arrives from April 26 to May 8 according to season. Departs about September 23; usually the majority have disappeared before this date. Breeds in late May and early June.

180. **Oporornis agilis.** CONNECTICUT WARBLER.—Rare migrant. One collected by A. B. Klugh on September 9, 1904.

181. **Oporornis philadelphia.** MOURNING WARBLER.—As a rule, a fairly common spring migrant arriving about May 18. Breeds sparingly. Last seen in early September.

182. **Geothlypis t. trichas.** NORTHERN YELLOW-THROAT.—Common summer resident. Arrives about May 8, leaves about September 15. Breeds in early June.

183. **Icteria v. virens.** YELLOW-BREASTED CHAT.—John Allan Jr., of Alma writes concerning this species in O. N. S. Bull No. 7, 1912: "On December 12, 1911, Mr. Wm. French (at his house about two miles south of Alma, Well. Co. Ont.) picked up the head and body of a decapitated bird on his veranda. He says it was not there on the 10th, but that it may have been on the roof and been blown down by the wind. In this case he could not say how long it had been there. It could not have been there long, as the feathers and body looked quite fresh when found. He sent the bird to me and I identified it as a Yellow-breasted Chat and sent it to Prof. A. B. Klugh of Queen's University who confirmed my identification." This apparently is the only record for the counties.

184. **Wilsonia p. pusilla.** WILSON'S WARBLER.—Rather scarce migrant. A few usually noted about May 25, and sometimes again in late August. A number of years I have failed to find it at all, either spring or fall. According to my experience it is much more apt to be met during the spring migrations.

185. **Wilsonia canadensis.** CANADA WARBLER.—Common summer resident. Arrives about May 10 and leaves about September 5, Breeds in late May and early June.

186. **Setophaga ruticilla.** AMERICAN REDSTART.—Common as a migrant; a number remain to nest. Arrives about May 10, and leaves early in September. W. F. N. C. records the species as late as September 19, 1905. Nests about June 10, although I once found a nest near Speedside as early as June 3, (1911) containing four eggs.

187. **Anthus rubescens.** AMERICAN PIPIT.—Usually a common migrant, arriving in spring about May 9, in small flocks. They resort to the fresh ploughed and seeded fields and linger occasionally for a couple of weeks. An odd straggler will often remain almost to the first of June. They appear again in the fall about September 22, usually in greater numbers than in the spring and commonly remain until about October 18, It is a common sight to see them walking about on the freshly ploughed ground in autumn.

188. **Dumetella carolinensis.** CATBIRD.—Common summer resident. Appears about May 10, and leaves as late as October 5. Lays eggs late in May, young deserting the nest about June 18.

189. **Toxostoma rufum.** BROWN THRASHER.—Breeds sparingly; arriving about May 6, and leaving early in September. I have found a number of nests; those with eggs about June 2. I have seen them carrying nesting material as early as May 7, near Guelph. Much more common in southern Wellington than in Waterloo County.

190. **Troglodytes a. aëdon.** HOUSE WREN.—Common summer resident. Arrives about May 6, and disappears, or becomes markedly scarce by early September, although many remain much longer. My latest record for a single bird on October 3, 1920 near Guelph. Breeds early in June. Young are able to fly by July 5.

191. **Nannus h. hiemalis.** WINTER WREN.—Fairly common summer resident. Arrives from April 2, until the end of the month. Commonly disappears sometime in October but in 1920, I saw one in a dense cedar swamp beside the Speed River west of Guelph as late as December 7. Have seen them nest building as early as April 28. They produce eggs about the second week in May. In 1911, I saw young still being fed by parents on July 16.

192. **Telmatodytes p. palustris.** LONG-BILLED MARSH WREN.—Klugh writes: "This is a species we have long looked for in the county but never with success until June 29, 1905, when I saw one in a marsh halfway between Guelph and Puslinch Lake. On July 19, I took one and saw another in a small marsh east of Puslinch Lake. These are so far the only records for the county." I have, myself, never seen it in either county.

193. **Certhia familiaris americana.** BROWN CREEPER.—Scarce resident. Common during migrations and frequently seen throughout the winter. Breeds sparingly. Most frequently noted during March and April and towards the end of the latter month I have repeatedly heard them in full song, which is a faint wavering trill lasting for two or three seconds. They nest in the month of June.

194. **Sitta c. carolinensis.** WHITE-BREASTED NUTHATCH.—Tolerably common resident, but much more frequent in winter, spring and fall. Seem to reach their maximum abundance in late March and early April and again in late September and early October.

195. **Sitta canadensis.** RED-BREASTED NUTHATCH.—Frequent migrant. Observed in spring from March 15, until late in May and again during October. Some years not seen at all. Klugh records a pair seen breeding by F. N. Beattie near Guelph during 1901.

196. **Penthestes a. atricapillus.** CHICKADEE.—Common resident. I have found a nest with a full clutch of seven eggs as early as May 24. They breed also in June and July.

197. **Penthestes h. hudsonicus.** HUDSONIAN CHICKADEE.—The only record I have here for this bird is a solitary individual seen in company with the common Chickadees in November, 1910, near Rockwood. The little company was frequenting a thick cedar swamp by the roadside.

198. **Regulus s. satrapa.** GOLDEN-CROWNED KINGLET.—A common bird during migrations, frequently wintering. Maximum abundance during April, sometimes in May and again in October. Often their faint lisping calls in the cedars form the dominant attraction on a bright warm morning in early April. Klugh found a pair breeding south of Guelph in 1904.

199. **Regulus c. calendula.** RUBY-CROWNED KINGLET.—Common migrant. In spring they begin to appear about April 21, and in a few days they are common; the woods colored with their sweetest of songs. The Kinglet migration of spring is one of the real bird events of the year. They disappear about the middle of May. Again observed in the fall from mid-September until late October. Often they are to be heard singing in October with all the vivid sweetness and beauty of their spring productions. The first record of the species nesting was a pair discovered by Prof. Crow on June 24, 1920 with their nest swung high up in a white spruce on the College campus, at Guelph. I watched the parents feeding the young several times in late June and early July. The brood was successfully raised. I wrote a full account of the incident to the 'Canadian Field Naturalist' Vol. XXXIV, No. 4.

200. **Hylocichla mustelina.** WOOD THRUSH.—Common during migrations, particularly during the spring. A few remain to nest. Arrives about May 6, and leaves about September 10.

201. **Hylocichla f. fuscescens.** VEERY.—Common summer resident. Arrives about May 5, departs early in September. Nests during late May and June. A nest which I found on June 23, 1915, still had unhatched eggs, three in number.

202. **Hylocichla a. aliciae.** GREY-CHEEKED THRUSH.—Frequent migrant. Arrives from April 25, until the middle of May. In 1921 I saw one as early as April 5. The weather was calm and summer-like and I sat in the woods and watched the bird at close range for ten minutes. Again observed about September 15.

203. **Hylocichla ustulata swainsoni.** OLIVE-BACKED THRUSH.—Frequent migrant. Arrives about May 16 and is again observed about the middle of September. I collected a male on each of the dates—May 17, 1915 and May 20, 1916.

204. **Hylocichla guttata pallasi**. HERMIT THRUSH.—Common migrant; frequent summer resident at Mount Forest. Arrives about April 18, and lingers about for ten days. Again seen from late September until the middle of October.

205. **Planesticus m. migratorius**. AMERICAN ROBIN.—Common summer resident. Arrives from March 2 until the 14th. Leaves from late October until November 18. They begin to flock early in August. Eggs are laid early in May and from then until July. Two to three broods are often reared. First young desert the nest about May 20–June 1; second brood is awing about July 10.

206. **Sialia sialis sialis**. BLUEBIRD.—Common summer resident. Arrives about March 12 and leaves about October 20. Breeds in May and June. The first brood leaves the nest about May 28; the second sometime in July.

Edmonton, Alberta.

EIGHTEENTH SUPPLEMENT TO THE AMERICAN ORNITHOLOGISTS' UNION CHECK-LIST OF NORTH AMERICAN BIRDS.

SINCE the appearance of the Seventeenth Supplement to the A. O. U. Check-List[1] the Committee on Nomenclature has passed on a considerable number of cases. These opinions are presented in the following pages. They are made up chiefly of ornithological cases, though some of purely nomenclatural bearing are introduced. The number of additions is 55; of accepted changes in nomenclature or status 32; of rejections 6; and of eliminations 7; total, 100.

Committee
- WITMER STONE, *Chairman*
- HARRY C. OBERHOLSER, *Secretary*
- JONATHAN DWIGHT
- T. S. PALMER
- CHARLES W. RICHMOND

ADDITIONS AND CHANGES.

52.1. **Larus thayeri** Brooks. THAYER'S GULL. Bull. Mus. Comp. Zoöl., LIX, No. 5, September, 1915, p. 373 ("Buchanan Bay, Ellesmere Land," Canada). New species. Range: Arctic coasts and islands of North America west of Greenland; south in winter to southern British Columbia, and casually to Delaware Bay.

[1] *Cf.* 'The Auk,' XXXVII, No. 3, July 14, 1920, pp. 439–449.

Gelochelidon nilotica (Linnaeus) becomes, by recognition of a North American subspecies, **Gelochelidon nilotica aranea** (Wilson); AMERICAN GULL-BILLED TERN. *Sterna aranea* Wilson, Amer. Ornith. VIII, 1814, after Jan. 19, p. 143, pl. LXXII, fig. 6 ("shores of Cape May," New Jersey). (*Cf.* Mathews, Birds Australia, II, part 3, September 20, 1912, p. 330; Hartert, Vögel paläarkt. Fauna, Heft XIII–XIV [Band II, 7–8], February, 1921, p. 1715.)

Sterna caspia Pallas becomes, by recognition of a North American subspecies, **Sterna caspia imperator** (Coues); COUES' CASPIAN TERN. *Thalasseus imperator* Coues, Proc. Acad. Nat. Sci. Phila., XIV, February, 1863, p. 538, in text (North America; type locality, Fort Resolution, Great Slave Lake, Mackenzie). (*Cf.* Mathews, Birds Australia, II, part 3, September 20, 1912, p. 337.)

Sterna anaetheta Scopoli becomes, by recognition of a North American subspecies, **Sterna anaethetus recognita** (Mathews); AMERICAN BRIDLED TERN. *Melanosterna anaethetus recognita* Mathews, Birds Australia, II, part 4, November 1, 1912, p. 403 ("Bahama breeding bird"). (*Cf.* Ridgway, Bull. U. S. Nat. Mus., No. 50, part VIII, June 26, 1919, p. 512.)

Procellariidae becomes **Hydrobatidae** (not Thalassidromidae), because of the change of the name of the type genus of the family, *Thalassidroma* Vigors, to *Hydrobates* Boie. (*Cf.* Oberholser, 'The Auk,' XXXVI, No. 2, April 8, 1919, p. 276.)

Priocella glacialoides (A. Smith) becomes **Priocella antarctica** (Stephens) (*Fulmarus antarcticus* Stephens, in Shaw's Gen. Zool., XIII, part 1, February, 1826, p. 236 "Antarctic Ocean, pretty far to the south"), since the latter is the earliest name for the species, and is not preoccupied by *Procellaria antarctica* Gmelin. (*Cf.* Mathews, Birds Australia, II, part 2, July 31, 1912, p. 127.)

84. **Phoebetria palpebrata** (J. R. Forster) becomes, by recognition of a Pacific-American subspecies, **Phoebetria palpebrata auduboni** Nichols and Murphy; AMERICAN SOOTY ALBATROSS. 'The Auk,' XXXI, No. 4, September 30, 1914, p. 531 ("mouth of the Columbia River, Oregon").

100.1. **Pterodroma cahow** (Nichols and Mowbray). BERMUDA PETREL. *Aestrelata cahow* Nichols and Mobray, 'The Auk,' XXXIII, No. 2, March 31, 1916, p. 194 ("Southeast side of Castle Island," Bermuda Islands). New species. Range: Bermuda Islands.

105.2. **Oceanodroma kaedingi** Anthony becomes **Oceanodroma leucorhoa kaedingi** Anthony, because considered only subspecifically distinct from *Oceanodroma leucorhoa*. (*Cf.* Willett, 'The Auk,' XXXII, No. 3, June 29, 1915, p. 301.)

Dafila acuta (Linnaeus) becomes, by recognition of an American subspecies, **Dafila acuta tzitzihoa** (Vieillot), AMERICAN PINTAIL. *Anas tzitzihoa* Vieillot, Nouv. Dict. d'Hist. Nat., V, about November, 1816, p. 163 ("Mexique"). (*Cf.* Reichenow, Ornith. Monatsb., IX,

No. 2, February, 1901, p. 18; Thayer and Bangs, 'The Auk,' XXXIII, No. 1, December 31, 1915, pp. 45–46.)

150.1. **Glaucionetta clangula clangula** (Linnaeus). GOLDEN-EYE. *Anas clangula* Linnaeus, Syst. Nat., ed. 10, I, January 1, 1758, p. 125 ("Europa"). Recorded as North American from a specimen taken on St. Paul Island, Pribilof Islands, Alaska. (*Cf.* Hanna, 'The Auk,' XXXIII, No. 4, October 11, 1916, p. 400.)

155a. **Histrionicus histrionicus pacificus** Brooks. WESTERN HARLEQUIN DUCK. Bull. Mus. Comp. Zoöl., LIX, No. 5, September, 1915, p. 393 ("Cape Shipunski, Kamchatka"). New subspecies. Range: western North America and northeastern Asia.

160. **Somateria dresseri** Sharpe becomes **Somateria mollissima dresseri** Sharpe, because considered only subspecifically distinct from *Somateria mollissima*. (*Cf.* C. W. Townsend, 'The Auk,' XXXIII, No. 3, June 30, 1916, pp. 291–292.)

165a. **Oidemia deglandi dixoni** Brooks. DIXON'S WHITE-WINGED SCOTER. Bull. Mus. Comp. Zoöl., LIX, No. 5, September, 1915, p. 393 ("Humphrey Point, Arctic Alaska"). New subspecies. Range: northern Mackenzie, northern Alaska, and northeastern Siberia, south in winter to China and Lower California.

Olor Wagler becomes **Cygnus** Bechstein (Ornith. Taschenb. Deutschl., Th. II, 1803, p. 404, footnote), because the type of the latter is, by tautonymy, *Anas cygnus* Linnaeus. (*Cf.* British Ornith. Union Committee, List Brit. Birds, ed. 2, 1915, p. 382.) The North American species will therefore now stand as follows:

179. **Cygnus cygnus** (Linnaeus).
180. **Cygnus columbianus** (Ord).
181. **Cygnus buccinator** Richardson.

Plegadis autumnalis (Linnaeus) becomes **Plegadis falcinellus** (Linnaeus) (*Tantalus falcinellus* Linnaeus, Syst. Nat. ed. 12, I, 1766, after May 24, p. 241; "Austria, Italia"), since, according to our present nomenclatural rules, *Tringa autumnalis* Linnaeus (in Hasselquist, Reise Paläst., 1762, p. 306) is ineligible for use, because appearing in a book that is merely a translation of a work published before 1758. (*Cf.* Mathews, Birds Australia, III, part 5, March 26, 1914, pp. 396–397; Oberholser, 'The Auk,' XXXV, No. 4, October 16, 1918, p. 476.)

194c. **Ardea herodias treganzai** Court. TREGANZA'S HERON. 'The Auk,' XXV, No. 3, by July 8, 1908, p. 291 ("Egg Island, Great Salt Lake, Utah"). Revived as a subspecies. (*Cf.* Oberholser, Proc. U. S. Nat. Mus., XLIII, December 12, 1912, p. 545.) Range: western United States (except the Pacific coast region north of Lower California), south in winter to southern Mexico.

194d. **Ardea herodias hyperonca** Oberholser. CALIFORNIA HERON. Proc. U. S. Nat. Mus., XLIII, December 12, 1912, p. 550 ("Baird,

northern California"). New subspecies. Range: Pacific coast region of the United States.

194c. **Ardea herodias sanctilucae** Thayer and Bangs. ESPIRITU SANTO HERON.

Ardea herodias sancti-lucae Thayer and Bangs, Proc. New Engl. Zoöl. Club, IV, February 23, 1912, p. 83 ("Espiritu Santo Island, Lower California"). New subspecies. Range: southern Lower California.

Philohela Gray becomes **Rubicola** Jameson (*Rubicola* "Vieill." Jameson, ed. Wilson's Amer. Ornith., III, 1831, p. 98; type, by monotypy, *Scolopax minor* Gmelin), because the latter is an earlier name, and valid, though introduced apparently by mistake. The only species is:

228. **Rubicola minor** (Gmelin).

Gallinula galeata (Lichtenstein) becomes, by recognition of its subspecific relationship with the European *Gallinula chloropus*, and by its subspecific distinctness from the South American typical form of the species, **Gallinula chloropus cachinnans** Bangs, Proc. New Engl. Zoöl. Club, V, May 17, 1915, p. 96 ("Arbuckle Creek, De Soto Co., Florida"). (*Cf.* Bangs, loc. cit., pp. 93, 94, 96–97.)

Tringa Linnaeus becomes **Calidris** Anonymous (Allgem. Lit.-Zeitung, 1804, II, No. 168, June 8, 1804, col. 542; type, by tautonymy, *Tringa calidris* Gmelin = *Tringa canutus* Linnaeus), because after *Tringa* Linnaeus is transferred to the group hitherto called *Helodromas*, the earliest available generic name for the Knot is *Calidris* Anonymous. (*Cf.* Oberholser, 'The Auk,' XXXVII, No. 3, July 14, 1920, pp. 451-452.) It therefore must now be called:

234. **Calidris canutus** (Linnaeus).

Machetes Cuvier becomes **Philomachus** Anonymous (Allgem. Lit.-Zeitung, 1804, II, No. 168, June 8, 1804, col. 542; type, by monotypy, *Tringa pugnax* Linnaeus), since the latter is of earlier date. (*Cf.* Richmond, Proc. U. S. Nat. Mus., LIII, August 16, 1917, p. 581; Oberholser, 'The Auk,' XXXVI, No. 2, April 8, 1919, p. 278.) The Ruff should therefore now be called

260. **Philomachus pugnax** (Linnaeus).

Squatarola squatarola (Linnaeus) becomes by recognition of an American subspecies, **Squatarola squatarola cynosurae** Thayer and Bangs; AMERICAN BLACK-BELLIED PLOVER. Proc. New Engl. Zoöl. Club, V, April 9, 1914, p. 23, in text ("Baillie Island, Arctic America").

Ochthodromus Reichenbach becomes **Pagolla** Mathews (Birds Australia, III, part 1, April 2, 1913, p. 83, in text; type, by original designation and monotypy, *Charadrius wilsoni* Ord), because *Ochthodromus* is preoccupied by *Ochthodromus* LeConte, Ann. Lyc. Nat. Hist. N. Y., IV, 1848, p. 453 (Coleoptera), and *Pagolla* is thus the only tenable name for the genus. (*Cf.* Oberholser, Trans. Wis. Acad. Sci., Arts, and Letters, XIX, part 1, December 30, 1918, p. 520.) The only North American species is

280. **Pagolla wilsonia wilsonia** (Ord).

295a. **Lophortyx gambelii sanus** Mearns. COLORADO GAMBEL'S QUAIL. Proc. Biol. Soc. Wash., XXVII, July 10, 1914, p. 113 ("Olathe, Montrose County, Colorado"). New subspecies. Range: southwestern Colorado.

297d. **Dendragapus obscurus flemingi** Taverner. FLEMING'S GROUSE. 'The Auk,' XXXI, No. 3, June 29, 1914, p. 385 ("Near Teslin Lake, Yukon Territory," Canada). New subspecies. Range: southern Yukon and southwestern Mackenzie to northern British Columbia.

Callipepla squamata squamata (Vigors) becomes, by recognition of the Arizona race as distinct from the Mexican typical subspecies, **Callipepla squamata pallida** Brewster; ARIZONA SCALED QUAIL. [*Callipepla squamata*] *pallida* Brewster, Bull. Nuttall. Ornith. Club, VI, No. 2, April, 1881, p. 72, in text (Rio San Pedro, Arizona"). (*Cf.* Bangs, Proc. New Engl. Zoöl. Club, IV, March 9, 1914, p. 100.)

300d. **Bonasa umbellus thayeri** Bangs. NOVA SCOTIA RUFFED GROUSE. 'The Auk,' XXIX, No. 3, July 6, 1912, p. 378 ("Digby, Nova Scotia"). New subspecies. Range: Nova Scotia.

300e. **Bonasa umbellus yukonensis** Grinnell. YUKON RUFFED GROUSE. The Condor, XVIII, No. 4, July 20, 1916, p. 166 ("Forty-mile (on Yukon River near Alaska boundary), Yukon Territory"). New subspecies. Range: interior of Yukon Territory and Alaska.

302g. **Lagopus rupestris sanfordi** Bent. TANAGA PTARMIGAN. Smithson. Misc. Coll., LVI, No. 30, January 6, 1912, p. 1 ("Tanaga Island, Aleutian Chain, Alaska"). New subspecies. Range: Tanaga Island, Aleutian Islands, Alaska.

304b. **Lagopus leucurus altipetens** Osgood. SOUTHERN WHITE-TAILED PTARMIGAN. 'The Auk,' XVIII, No. 2, by March 30, 1901, p. 180 ("Mt. Blaine, Colorado"). Revived as a subspecies. (*Cf.* Riley, Canadian Alpine Journal, special number, 1921 [February 17, 1913] p. 60). Range: Rocky Mountain region of the United States.

316b. **Zenaidura macroura caurina** Ridgway. DUSKY MOURNING DOVE. Bull. U. S. Nat. Mus., No. 50, part VII, May 5, 1916, p. 348, footnote ("Oregon"). New subspecies. Range: Pacific coast region of the northwestern United States.

Geotrygon Gosse becomes, so far as North America is concerned, **Oreopeleia** Reichenbach, Nat. Syst. Vögel, 1853, p. XXV (type, by monotypy and original designation, *Col*[*umba*]. *martinicana* Brisson = *Columba martinica* Linnaeus). (*Cf.* Ridgway, Bull. 50, part VII, May 5, 1916, pp. 467–484.) The species of *Geotrygon* in the A. O. U. Check-List will therefore now stand as:

322. **Oreopeleia chrysia** (Salvadori).

322.1. **Oreopeleia montana** (Linnaeus).

Buteonidae becomes **Accipitridae,** because *Accipiter* is the type and earliest described genus, instead of *Buteo.* (*Cf.* Oberholser, 'The Auk,' XXXVI, No. 4, October 31, 1919, p. 569.)

339c. **Buteo lineatus texanus** Bishop. TEXAS RED-SHOULDERED HAWK. 'The Auk,' XXIX, No. 2, April 5, 1912, p. 232 ("Corpus Christi, Texas"). New subpsecies. Range: central southern Texas.

Aluco pratincola (Bonaparte) becomes **Tyto alba pratincola** (Bonaparte), AMERICAN BARN OWL, because considered only subspecifically distinct from the European typical race, **Tyto alba.** (*Cf.* Hartert, Vögel paläarkt. Fauna, Heft VIII, [Band II, 2], August, 1913, p. 1039.) For change of the generic name *Aluco* to *Tyto*, *cf.* the 17th Supplement to the A. O. U. Check-List ('The Auk,' XXXVII, No. 3, July 14, 1920, p. 444).

Strix varia albogilva Bangs becomes again **Strix varia helveola** (Bangs) (*Syrnium nebulosum helveolum* Bangs, Proc. New Engl. Zoöl. Club, I, March 31, 1899, p. 31; "Corpus Christi, Texas"), because the latter name is now considered not preoccupied by *Strix helvola* Lichtenstein. (*Cf.* Oberholser, 'The Auk,' XXXVI, No. 2, April 8, 1919, p. 283.)

369b. **Strix occidentalis lucida** (Nelson). ARIZONA SPOTTED OWL. *Syrnium occidentale lucidum* Nelson, Proc. Biol. Soc. Wash., XVI, November 30, 1903, p. 152 ("Mt. Tancitaro, Michoacan, Mexico"). Recorded from the southwestern United States. *Strix occidentalis huachucae* Swarth is considered identical. (*Cf.* Oberholser, Proc. U. S. Nat. Mus., XLIX, July 26, 1915, p. 256.) Range: southwestern United States and northern and central Mexico.

Cerchneis Boie. Raised to generic rank. (*Cf.* Chapman, Bull. Amer. Mus. Nat. Hist., XXXIV, May 27, 1915, pp. 372–382). It includes the following forms of the genus *Falco:*

359.1. **Cerchneis tinnunculus** (Linnaeus).
360. **Cerchneis sparveria sparveria** (Linnaeus).
360a. **Cerchneis sparveria phalaena** (Lesson).
360b. **Cerchneis sparveria peninsularis** (Mearns).
360c. **Cerchneis sparveria paula** (Howe and King).
361. **Cerchneis sparverioides** (Vigors).

372b. **Cryptoglaux acadica brooksi** Fleming. ISLAND SAW-WHET OWL. 'The Auk,' XXXIII, No. 4, October 11, 1916, p. 422 ("Graham Island, Queen Charlotte Islands, British Columbia"). New subspecies. Range: Queen Charlotte Islands, British Columbia.

373j. **Otus asio hasbroucki** Ridgway. HASBROUCK'S SCREECH OWL. Bull. U. S. Nat. Mus., No. 50, part VI, April 8, 1914, p. 694 ("Palo Pinto County, Texas"). New subspecies. Range: central and north central Texas.

373k. **Otus asio quercinus** Grinnell. PASADENA SCREECH OWL. 'The Auk,' XXXII, No. 1, January 1, 1915, p. 60 ("Pasadena, Los Angeles County, California"). New subspecies. Range: southwestern California.

373l. **Otus asio brewsteri** Ridgway. BREWSTER'S SCREECH OWL. Bull. U. S. Nat. Mus., No. 50, part VI, April 8, 1914, p. 700 ("Salem, Oregon"). New subspecies. Range: western Oregon.

373.2. **Otus xantusi** (Brewster) becomes **Otus asio xantusi** (Brewster), because considered only subspecifically distinct from *Otus asio*. (*Cf.* Ridgway, Bull. U. S. Nat. Mus., No. 50, part VI, April 8, 1914, p. 703.)

375h. **Bubo virginianus lagophonus** Oberholser. NORTHWESTERN HORNED OWL. *Asio magellanicus lagophonus* Oberholser, Proc. U. S. Nat. Mus., XXVII, January 22, 1904, p. 185 ("Fort Walla Walla, Washington"). Revived as a subspecies. (*Cf.* Ridgway, Bull. U. S. Nat. Mus., No. 50, part VI, April 8, 1914, p. 747.) Range: Idaho and interior of northern Oregon, north to central Alaska.

375i. **Bubo virginianus icelus** (Oberholser). COAST HORNED OWL. *Asio magellanicus icelus* Oberholser, Proc. U. S. Nat. Mus., XXVII, January 22, 1904, p. 185 ("San Luis Obispo, California"). Revived as a subspecies. (*Cf.* Ridgway, Bull. U. S. Nat. Mus., No. 50, part VI, April 8, 1914, p. 746.) Range: south central coast region of California.

375k. **Bubo virginianus occidentalis** Stone. PALE HORNED OWL. *B[ubo]. virginianus occidentalis* Stone, 'The Auk,' XIII, No. 2, by April 9, 1896, p. 156, in text ("Mitchell Co., Iowa"). Revived as a subspecies. (*Cf.* Ridgway, Bull. U. S. Nat. Mus., No. 50, part VI, April 8, 1914, p. 743.) Range: western United States from Minnesota and Montana south to Kansas and Utah.

375l. **Bubo virginianus neochorus** Oberholser. NEWFOUNDLAND HORNED OWL. Proc. Biol. Soc. Wash., XXVII, March 20, 1914, p. 46 ("Fox Island River, Newfoundland"). New subspecies. Range: Newfoundland and Nova Scotia.

379b. **Glaucidium gnoma swarthi** Grinnell. VANCOUVER PYGMY OWL. 'The Auk,' XXX, No. 2, March 31, 1913, p. 224 ("Errington, Vancouver Island, British Columbia"). New subspecies. Range: Vancouver Island, British Columbia.

379c. **Glaucidium gnoma grinnelli** Ridgway. COAST PYGMY OWL. Bull. U. S. Nat. Mus., No. 50, part VI, April 8, 1914, p. 791 ("Humboldt Bay, California"). New subspecies. Range: Pacific coast region from central California to southern British Columbia.

381a. **Micropallas whitneyi idonea** Ridgway. TEXAS ELF OWL. *Micropallas whitneyi idoneus* Ridgway, Bull. U. S. Nat. Mus., No. 50, part VI, April 8, 1914, p. 810 ("five miles from Hidalgo, Texas"). New subspecies. Range: southern central Texas, south to the Valley of Mexico.

381b. **Micropallas whitneyi sanfordi** Ridgway. SANFORD'S ELF OWL. Bull. U. S. Nat. Mus., No. 50, part VI, April 8, 1914, p. 809 ("Miraflores, Lower California"). New subspecies. Range: Southern Lower California.

Chloroceryle Kaup. Raised to generic rank. (*Cf.* Ridgway, Bull. U. S. Nat. Mus., No. 50, part VI, April 8, 1914, p. 421; Miller, Bull. Amer.

Mus. Nat. Hist., XXXI, September 12, 1912, pp. 266–287; 304–311.) The only North American form is:

391. **Chloroceryle americana septentrionalis** (Sharpe).

393i. **Dryobates villosus orius** Oberholser. SIERRA WOODPECKER. Proc. U. S. Nat. Mus., XL, June 3, 1911, p. 609 ("Quincy, California"). Revived as a subspecies. (*Cf.* Ridgway, Bull. U. S. Nat. Mus., No. 50, part VI, April 8, 1914, p. 215.) Range: Nevada, eastern California, central and eastern Oregon, and south central Washington.

393j. **Dryobates villosus icastus** Oberholser. CHIHUAHUA WOODPECKER. Proc. U. S. Nat. Mus., XL, June 3, 1911, p. 612 ("El Salto, Durango, Mexico"). Revived as a subspecies. (*Cf.* Ridgway, Bull. U. S. Nat. Mus., No. 50, part VI, April 8, 1914, p. 221.) Range: southeastern Arizona, southwestern New Mexico, south to Tepic and Zacatecas, Mexico.

393k. **Dryobates villosus sitkensis** Swarth. SITKA HAIRY WOODPECKER. Univ. Calif. Publ. Zool., VII, No. 9, October 9, 1911, p. 315 ("Etolin Island, Alaska"). Revived as a subspecies. (*Cf.* Ridgway, Bull. U. S. Nat. Mus., No. 50, part VI, April 8, 1914, p. 220.) Range: coast region of southeastern Alaska.

394f. **Dryobates pubescens microleucus** Oberholser. NEWFOUNDLAND DOWNY WOODPECKER. Proc. Biol. Soc. Wash., XXVII, March 20, 1914, p. 43 ("Fox Island River," Newfoundland). New subspecies. Range: Newfoundland.

394g. **Dryobates pubescens glacialis** Grinnell. VALDEZ DOWNY WOODPECKER. Grinnell, Univ. Calif. Publ. Zool., V, No. 12, March 5, 1910, p. 390 ("Valdez Narrows, Prince William Sound, Alaska"). Revived as a subspecies. (*Cf.* Ridgway, Bull. U. S. Nat. Mus., No. 50, part VI, April 8, 1914, p. 239.) Range: southern Alaska, from the Kenai Peninsula to northern British Columbia.

396c. **Dryobates scalaris symplectus** Oberholser. TEXAS WOODPECKER. Proc. U. S. Nat. Mus., XLI, June 30, 1911, p. 155 ("Mouth of Nueces River, Texas"). Revived as a subspecies. (*Cf.* Ridgway, Bull. U. S. Nat. Mus., No. 50, part VI, April 8, 1914, p. 257.) Range: northeastern Mexico, through middle Texas to southeastern Colorado.

399a. **Xenopicus albolarvatus gravirostris** Grinnell. SOUTHERN WHITE-HEADED WOODPECKER. *Xenopicus gravirostris* Grinnell, The Condor, IV, No. 4, July 17, 1902, p. 89 ("Camp Chilco, Sierra San Gabriel, Los Angeles County, California"). Revived as a subspecies. (*Cf.* Ridgway, Bull. U. S. Nat. Mus., No. 50, part VI, April 8, 1914, p. 267.) Range: southern California.

405b. **Phloeotomus pileatus floridanus** Ridgway. FLORIDA PILEATED WOODPECKER. Proc. Biol. Soc. Wash., XXIV, February 24, 1911. p. 33 ("Prevatt's Camp, 24 miles S. W. of Kissimmee, Florida"). Revived as a subspecies. (*Cf.* Ridgway, Bull. U. S. Nat. Mus., No. 50, part VI, April 8, 1914, p. 159.) Range: central and southern Florida.

405c. **Phloeotomus pileatus picinus** Bangs. WESTERN PILEATED WOODPECKER. Proc. New England Zoöl. Club, IV, April 2, 1910, p. 79 ("Sumas, British Columbia"). Revived as a subspecies. (*Cf.* Ridgway, Bull. U. S. Nat. Mus., No. 50, part VI, April 8, 1914, p. 162.) Range: British Columbia and western Montana, south to central California.

412b. **Colaptes auratus borealis** Ridgway. BOREAL FLICKER. Proc. Biol. Soc. Wash., XXIV, February 24, 1911, p. 31 ("Nulato, lower Yukon River, Alaska"). Revived as a subspecies. (*Cf.* Ridgway, Bull. U. S. Nat. Mus., No. 50, part VI, April 8, 1914, p. 20.) Range: Canada east of the Rocky Mountains and north to the limit of trees; Alaska; central northern United States; and south occasionally in winter to California and Colorado; accidental in Greenland and on the Pribilof Islands, Alaska.

Colaptes cafer saturatior Ridgway becomes **Colaptes cafer cafer** (Gmelin) (*Picus cafer* Gmelin, Syst. Nat., I, i, 1788, before July 25, p. 431; "Caput bonae spei"), because the type locality of *Picus cafer* Gmelin is now shown to be Nootka Sound, British Columbia, and *Colaptes cafer saturatior* is therefore a synonym. (*Cf.* Palmer, 'The Auk,' XXXIII, No. 3, June 30, 1916, pp. 322–324.)

421a. **Chordeiles acutipennis inferior** Oberholser. SAN LUCAS NIGHTHAWK. Bull. U. S. Nat. Mus., No. 86, April 6, 1914, pp. 24, 109 ("Triunfo, Lower California, Mexico"). New subspecies. Range: Lower California, Mexico.

Atthis morcomi Ridgway becomes **Atthis heloisa morcomi** Ridgway, because regarded as only subspecifically separable from *Atthis heloisa*. (*Cf.* Ridgway, Bull. U. S. Nat. Mus., No. 50, part V, November 29, 1911, p. 595.)

Amizilis Gray becomes **Amazilia** Lesson (L'Echo du Monde Savant, ser. 2, VIII, No. 32, October 22, 1843, col. 757; type by subsequent designation [Stone, Proc. Acad. Nat. Sci. Phila., LXX, December 4, 1918, p. 256], *Ornismia cinnamomea* Lesson), because *Amizilis* Gray proves to be a synonym of *Cynanthus* Swainson, and the earliest available name for the genus hitherto called *Amizilis* is *Amazilia* Lesson. The North American forms will now stand as follows:

438. **Amazilia tzacatl tzacatl** (De La Llave).

439. **Amazilia yucatanensis chalconota** Oberholser.

439.1. **Amazilia salvini** (Brewster).

Amizilis cerviniventris chalconota (Oberholser) becomes **Amazilia yucatanensis chalconota** Oberholser, because regarded as only subspecifically separable from **Amazilia yucatanensis.** (*Cf.* Ridgway, Bull. U. S. Nat. Mus., No. 50, part V, November 29, 1911, p. 415.)

Uranomitra salvini (Brewster) becomes **Amazilia salvini** (Brewster), by the mergence of the generic group *Uranomitra* with *Amazilia* (=*Amizilis*). (*Cf.* Ridgway, Bull. U. S. Nat. Mus., No. 50, part V, November 29, 1911, p. 429.)

485d. **Perisoreus canadensis sanfordi** Oberholser. NEWFOUNDLAND JAY. Proc. Biol. Soc. Wash., XXVII, March 20, 1914, p. 49 ("Fox Island River, Newfoundland"). New subspecies. Range: Newfoundland and Nova Scotia.

488c. **Corvus brachyrhynchos paulus** Howell. SOUTHERN CROW. Proc. Biol. Soc. Wash., XXVI, October 23, 1913, p. 199 ("Bon Secour, Alabama"). New subspecies. Range: southeastern United States (except Florida), north to the District of Columbia and southern Illinois, and west to eastern Texas.

489. **Corvus caurinus** Baird becomes **Corvus brachyrhynchos caurinus** Baird, because regarded as only subspecifically separable from *Corvus brachyrhynchos*. (*Cf.* Ridgway, Bull. U. S. Nat. Mus., No. 50, part III, December 31, 1904; Swarth, Univ. Calif. Publ. Zool., X, No. 1, February 13, 1912, p. 50.)

498h. **Agelaius phoeniceus nevadensis** Grinnell. NEVADA RED-WINGED BLACKBIRD. Proc. Biol. Soc. Wash., XXVII, May 11, 1914, p. 107 ("Quinn River Crossing, Humboldt County, Nevada"). New subspecies. Range: Nevada and northeastern California.

498i. **Agelaius phoeniceus aciculatus** Mailliard. KERN RED-WINGED BLACKBIRD. The Condor, XVII, No. 1, January 30, 1915, p. 13 ("Isabella, Kern County, California"). New subspecies. Range: Kern County, California.

515e. **Pinicola enucleator eschatosus** Oberholser. NEWFOUNDLAND PINE GROSBEAK. Proc. Biol. Soc. Wash., XXVII, March 20, 1914, p. 51 ("Harry's River, Newfoundland"). New subspecies. Range: Newfoundland; south in winter to Massachusetts.

521b. **Loxia curvirostra percna** Bent. NEWFOUNDLAND CROSSBILL. Smithson. Misc. Coll., LX, No. 15, December 12, 1912, p. 1 ("Flatbay River, Newfoundland"). New subspecies. Range: Newfoundland; south in winter to Massachusetts.

524b. **Leucosticte tephrocotis dawsoni** Grinnell. SIERRA NEVADA ROSY FINCH. The Condor, XV, No. 2, March 25, 1913, p. 77 ("Whitney Meadows, 9800 feet altitude, Sierra Nevada, Tulare County, California"). New subspecies. Range: Sierra Nevada, California.

587b. **Pipilo erythrophthalmus canaster** Howell. ALABAMA TOWHEE. Proc. Biol. Soc. Wash., XXVI, October 23, 1913, p. 202 ("Spring Hill near Mobile, Alabama"). New subspecies. Range: Alabama.

588f. **Pipilo maculatus falcifer** McGregor. SAN FRANCISCO TOWHEE. The Condor, II, No. 2, March 16, 1900, p. 43 ("Palo Alto, California"). Revived as a subspecies. (*Cf.* Swarth, The Condor, XV, No. 5, October 15, 1913, p. 171.) Range: coast region of central and northern California.

588g. **Pipilo maculatus curtatus** Grinnell. NEVADA TOWHEE. Univ. Calif. Publ. Zool., VII, No. 8, August 24, 1911, p. 309 ("Big Creek Ranch, altitude 4350 feet, base of Pine Forest Mountains, Humboldt County, Nevada"). Revived as a subspecies. (*Cf.* Swarth, The

Condor, XV, No. 5, October 15, 1913, p. 173.) Range: eastern Oregon to Nevada and northeastern California.

588h. **Pipilo maculatus falcinellus** Swarth. SACRAMENTO TOWHEE. The Condor, XV, No. 5, October 15, 1913, p. 172 ("Marysville Buttes, altitude 500 feet, 4 miles northwest of Sutter, Sutter County. California"). New subspecies. Range: middle California, from Tulare County north to the northern boundary of the State.

Zamelodia Coues becomes **Hedymeles** Cabanis (Museum Heineanum, I, 1851, after October 23, p. 152; type, by subsequent designation [Gray, Cat. Gen. and Subgen. Birds Brit. Mus., 1855, p. 71], *Loxia ludoviciana* Linnaeus), because *Hedymeles* is now not considered preoccupied by *Hedymela* Sundevall. (*Cf.* Oberholser, 'The Auk,' XXXVI, No. 1, January 5, 1919, p. 115.) The two species of this genus are:

595. **Hedymeles ludovicianus** (Linnaeus).

596. **Hedymeles melanocephalus** (Swainson).

612.1a. **Petrochelidon fulva pallida.** Nelson. COAHUILA CLIFF SWALLOW. Proc. Biol. Soc. Wash., XV, October 10, 1902, p. 211 ("Saltillo, Coahuila, Mexico"). Recorded from central Texas. (*Cf.* Bishop, 'The Auk,' XXVII, No. 4, by October 10, 1910, p. 459.)

655a. **Dendroica coronata hooveri** McGregor. HOOVER'S WARBLER. Bull. Cooper Ornith. Club, I, No. 2, March 15, 1899, p. 32 ("Palo Alto, California"). Revived as a subspecies. (*Cf.* Swarth, Univ. Calif. Publ. Zool., X, No. 1, February 13, 1912, p. 68; Oberholser, 'The Auk,' XXV, No. 4, October 16, 1918, p. 465.) Range: western North America from Mackenzie and Alaska south to central British Columbia and Alberta, and in winter to Lower California and Vera Cruz, Mexico.

681f. **Geothlypis trichas scirpicola** Grinnell. TULE YELLOW-THROAT. The Condor, III, No. 3, May 15, 1901, p. 65 ("El Monte, Los Angeles County, California"). Revived as a subspecies. (*Cf.* Swarth, Univ. Calif. Publ. Zool., X, No. 1,February 13, 1912. p. 68. Range : southern California.

751b. **Salpinctes obsoletus proximus** Swarth. SAN MARTIN ROCK WREN. *Salpinctes guadeloupensis proximus* Swarth, The Condor, XVI, No. 5, September 15, 1914, p. 215 ("San Martin Island, Lower California"). Recognized as a subspecies of *Salpinctes obsoletus*. (*Cf.* Oberholser, 'The Auk', XXXVI, No. 3, June 28, 1919, pp. 407, 408.) Range: San Martin Island, Lower California.

REJECTIONS AND ELIMINATIONS.

Melanosterna Blyth, as a genus to include *Sterna anaethetus recognita*. (*Cf.* Mathews, Birds Australia, II, part 4, November 1, 1912, p. 395.) Regarded as not generically distinct from *Sterna* Linnaeus. (*Cf.* Ridgway, Bull. U. S. Nat. Mus., No. 50, part VIII, June 26, 1919, pp. 485–486.)

Sula piscator (Linnaeus) versus **Sula sula** (Linnaeus). (*Cf.* Mathews, Birds Australia, II, part 3, June 23, 1915, pp. 207–209.) Change rejected, because the name *Pelecanus piscator* Linnaeus, though a mixture of two species, the common Brown Booby and the Red-footed Booby, is, notwithstanding this, available by subsequent restrictions for the latter bird. (*Cf.* Sclater, Bull. Brit. Ornith. Club, XXXV, No. CCI II, January 27, 1915, pp. 48–49; Wetmore, Bull. Mus. Comp. Zoöl., LXIII, No. 4, August, 1919, pp. 168–170.)

Polysticta Eyton versus **Heniconetta** Gray. (*Cf.* British Ornithologists' Union Committee, List Brit. Birds, ed. 2, 1915, p. 385.) Change rejected, because *Polysticta* Eyton (Catal. Brit. Birds, April, 1836, p. 58) is not preoccupied by *Polysticte* Smith (Report Explor. Central Africa, June or later, 1836, p. 53). (*Cf.* Oberholser, 'The Auk,' XXXVI, No. 2, April 8, 1919, p. 277; *ibid.*, No. 3, June 28, 1919, p. 418.)

191.1 **Ixobrychus neoxenus** (Cory). Eliminated, because considered only a color phase of *Ixobrychus exilis* (Gmelin). (*Cf.* Bangs, 'The Auk,' XXXII, No. 4, October 7, 1915, p. 483.)

Neopisobia Mathews (Birds Australia, III, part 3, August 18, 1913, p. 245, in text; type, by original designation and monotypy, "The bird described by Horsfield as *Totanus damacensis*"), proposed as a subgenus of *Pisobia*. Rejected, because *Totanus damacensis* Horsfield proves to be the same as *Pisobia ruficollis* (*cf.* Hartert, Novit. Zool., XXIII, No. 1, April 14, 1916, pp. 92–93), which is a typical *Pisobia*, and *Neopisobia* thus is a strict synonym of *Pisobia*.

Strix occidentalis huachucae Swarth, Univ. Calif. Publ. Zool., VII, No. 1, May 26, 1910, p. 3 ("Huachuca Mountains, Arizona"). Rejected because considered identical with *Strix occidentalis lucida* Nelson, from the same region. (*Cf.* Oberholser, Proc. U. S. Nat. Mus., XLIX, July 26, 1915, p. 253.)

Strix occidentalis caurina (Merriam). Eliminated, because considered identical with *Strix occidentalis occidentalis*. (*Cf.* Oberholser, Proc. U. S. Nat. Mus., XLIX, July 26, 1915, pp. 253–255.)

Cryptoglaux acadica scotaea (Osgood). Eliminated, because regarded as identical with *Cryptoglaux acadica acadica* (Gmelin). (*Cf.* Ridgway, Bull. U. S. Nat. Mus., No. 50, part VI, April 8, 1914, pp. 629, 633.)

Otus flammeolus idahoensis (Merriam). Eliminated, because regarded as not separable from *Otus flammeolus*. (*Cf.* Ridgway, Bull. U. S. Nat. Mus., No. 50, part VI, April 8, 1914, pp. 730–732.)

Coccyzus minor minor (Gmelin). Eliminated, because all the North American records prove to belong under *Coccyzus minor maynardi* Ridgway. (*Cf.* Ridgway, Bull. U. S. Nat. Mus., No. 50, part VII, May 5, 1916, pp. 21–28.)

Phalaenoptilus nuttallii nitidus Brewster. Eliminated, because regarded as a color phase of *Phalaenoptilus nuttallii nuttallii* (Audubon).

(*Cf.* Ridgway, Bull. U. S. Nat. Mus., No. 50, part VI, April 8, 1914, pp. 548–552.)

Uranomitra Reichenbach. Eliminated, because considered not separable from *Amazilia* Lesson. (*Cf.* Ridgway, Bull. U. S. Nat. Mus., No. 50, part V, November 29, 1911, p. 406.) The only North American species will therefore now stand as:

439.1. **Amazilia salvini** (Brewster).

520.2. **Passer domesticus** (Linnaeus) versus **Passer hostilis** Kleinschmidt, Falco, XI, No. 2, December, 1915, p. 19 (Tring, England). Change rejected, because the English bird, from which the American is descended, is not sufficiently different from typical *Passer domesticus* of continental Europe to be separated even subspecifically. (*Cf.* Witherby, Pract. Handb. Brit. Birds, I, part 2, April 30, 1919, p. 101.)

GENERAL NOTES.

Notes on the Diving of Loons and Ducks.—The notes recently published in the January number of 'The Auk,' on this subject, remind me of the tale of the "Two Knights and the Shield."

Loons as well as Ducks, Auks and other allied species use their wings in swimming under water, as a general rule, but there are times when they do not. When a bird dives and uses its wings, it leaves behind a wake of bubbles of air, which clearly indicate the direction in which it is going. Through some instinct, I believe, the birds realize this, so that when they desire to sneak away without attracting attention, the feet only are used. Wounded birds often do this, as well as nesting birds. They appear to glide along with very little disturbance of the water. I have had abundant opportunities of observing this trait, in many kinds of birds, both in fresh and salt water. When not using the wings Ducks cannot make very long dives. This is the reason why so many Ducks, of the Scoter family especially, have been chased and drowned during the molting season. When scared by the firing of guns they would dive as deeply as possible to try and escape. Having few or no feathers on the wings, they could not return to the surface fast enough, got exhausted and drowned. This used to be an old time dodge of collecting a large lot of birds, either for meat or feathers, and was practiced by men of the cod fishing fleet. Scoters when molting congregate together in large numbers, at certain localities, where food is abundant, shell fish of some kind, but preferably near blue mussel or oyster beds. After feeding they move out to sea some two or three miles off shore. If perchance during a fog some steamer happens to run through or near a flock, they become frightened, dive, and hundreds are drowned. In August, 1918, such an occurrence happened near Bic, St. Lawrence River. and over five hundred drowned birds were picked up next day, by boats, crossing over to the north shore.—Nap. A. Comeau, *Godbout, Quebec.*

Western Grebe in Illinois.—I am indebted to Mr. Boardman Conover for a specimen of the Western Grebe (*Aechmophorus occidentalis*), which he presented to me in the flesh on December 27, 1921, and which is now in my collection. Mr. Conover informed me that this bird was shipped to him on December 24 from Swan Lake, Putnam County, Illinois, where it had been killed probably that day or the day before.

The identification of the specimen was made with the assistance of Mr. C. C. Sanborn by comparison with skins in the Field Museum of Natural History.

I have not been able to find any previous record of the occurrence of the Western Grebe in Illinois.—Stephen S. Gregory, Jr., *345 Barry Ave., Chicago, Ill.*

The Glaucous Gull at Ithaca, N. Y.—On February 13, 1921 a Glaucous Gull, *Larus hyperboreus* was observed in a large flock of Herring Gulls at the south end of Cayuga Lake. It was seen again on February 20, and on March 26 it was picked up dead and brought in to the museum of Cornell University by a vocational student. The bird was a male, not fully adult in plumage, numerous flecks of brownish being present on the wings and head. The specimen is now in the collection of the museum of Cornell University and forms the first record for the Cayuga Lake Basin.

On March 29, 1923 another specimen of this Gull was seen in practically the same spot. It was seen again on April 3, but has not been observed since. This bird, like the first one, was not pure white but showed faint brownish markings.

In view of the rarity of this species in central New York these records seem worthy of publication.—Herbert Friedman and Dana J. Leffingwell, *Cornell University, Ithaca, N. Y.*

Concerning the Field Identification of the Anatidae.—In his recent paper on 'Field Studies of the Anatidae,' Mr. Ludlow Griscom has given us a valuable compilation of points not to be found in most textbooks, and yet extremely useful to the field student. Many of us who think we already know the Anatidiae will find new and useful facts in this paper. There are, however, two points that have come into my own experience that have evidently escaped Mr. Griscom's attention, Which I believe are worth putting on record to save the future field worker from possible mistakes in identification.

Many species of Ducks have the head marked with green or black with greenish reflections. Observations on a semi-domesticated drake Mallard showed me that when the bird swam with head toward the observer, the color of the head appeared to be violet rather than green. Later examination of a mounted drake Golden-eye showed the same thing to be true. Examination of other species shows that this seems, generally true of all species with heads green or marked with green. The feathers are green when viewed directly, but when the head of the bird is toward the observer, they appear violet.

It is not often that a Scaup Duck can be seen closely enough in life to make out the color of the reflections on the head. When such a case does occur, however, it seems entirely possible that a person seeing a Greater Scaup, with its head turned toward him, would see violet reflections and identify it as the Lesser. One might also easily imagine a case where an observer seeing a Golden-eye in such a position would make out violet reflections. The spot in front of the eye, from its foreshortened appearance, might be easily imagined crescentic, and the bird thought to be Barrow's Golden-eye.

Plumages of immature birds have not been described fully or completely in most text-books. In some cases these plumages differ enough from the adult to make mistakes for some other species possible. In December 1921, I was hunting Ducks on the Penfield Reef at Fairfield, Conn. I was particularly anxious to get a Scaup Duck, a bird that was less common on the reef than the Scoters and Old-squaws. Finally I saw a bird approaching with black neck and upper breast and lower parts abruptly white. I felt no doubt at all that this was a Scaup Duck, and as it flew almost directly over my head I took careful aim and shot it. The bird I picked up, proved a young male Surf Scoter.

Few books describe the plumages of young males of Surf and White-winged Scoters. While not so purely white beneath as is the Scaup, they nevertheless have much the same appearance when flying toward an observer. They seem to wear this plumage throughout the first winter, for I have seen birds in it in May. I puzzled for a number of years over a young male White-winged Scoter I had once seen under rather unusual circumstances. Its description remained unnamed in my note-book for a number of years, for none of the books I possessed described this plumage. Finally, when I happened to shoot a bird in this plumage, the mystery was solved.—ARETAS A. SAUNDERS, *Fairfield, Conn.*

Ducks useful in Arkansas as Scavengers of Red Rice.—At least $150,000 a year is saved to Arkansas rice growers by migratory wild Ducks feeding on red rice, according to an estimate furnished to the Biological Survey by the Board of Directors of the Arkansas Rice Growers' Cooperative Association. In that State the Ducks are so beneficial that every effort is made to attract them on their way south. The present early closed season and an even smaller bag limit are protective measures strongly approved in Arkansas.

The control of the growth of wild or red rice is one of the greatest difficulties incidental to rice culture. The land becomes easily polluted with red rice which is scattered on the ground when the good rice is cut, and comes up in the next crop in the spring. Many of the red grains are forced below the surface of the ground by wagon wheels and the feet of the horses and men, when the bundles of good rice are hauled out to be threshed. Although thousands of Blackbirds use the rice fields for feeding grounds when migrating, they do not get the grains that are covered with water

or mud. The Ducks, however, which live in the wet fields in winter, sift out this buried wild rice, to the great advantage of the rice grower.

Rice fields are usually drained before the grain is cut, and the Ducks would fly over these dry fields were it not for the custom, rapidly increasing, for those who have learned to use the Ducks, to pump water into the cuts between the levees so as to attract migrating Mallards which soon come in by the thousands. Under these conditions it is said that the Ducks do not feed on the shocked rice. They feed on the ground rice and clean it all up in three or four days.

While instances of damage to rice by wild Ducks are on record for Arkansas and Louisiana such damage has occurred under extraordinary conditions, as when scarcity of labor or other causes have delayed the harvest until the full migration of Ducks was under way and the fields submerged by winter rains. This happened during the war but probably will not be allowed to occur again to any extent. While damage is sporadic, the good done by the wild Ducks is a yearly benefit of which it is hoped rice growers throughout the Southern States will avail themselves. All that it is necessary to do is to get the crop out of the fields in season, flood the ground when the Ducks first come, and protect them as long as they stay. With the help of these birds red rice will become a rarity instead of a common and persistent weed as at present.—W. L. MacAtee, *U. S. Biological Survey, Washington, D. C.*

The Harlequin Duck in Massachusetts.—On February 22, 1923, in company with Mr. Charles Clark of Medford and Prof. F. E. Saunders of Cambridge I observed a Harlequin Duck (*Histrionicus histrionicus*) off Eastern Point, Essex County, Massachusetts. The Duck permitted a close inspection three times and was observed in flight and on the water. The bird was quite tame and though flushed twice it flew but a short distance and returned to the rocky point where it was first observed.

There are but few records of this rare Duck in this state. There are three records, and a possible fourth from this county.—Charles B. Floyd, *Auburndale, Mass.*

Occurence of the Barnacle Goose on Long Island.—I arrived at my office near Farmingdale, L. I., on the morning of November 28, 1922, and found that Mr. H. J. Hutchinson, one of my assistants had just shot a Goose on our pond. Being on the point of leaving, I wrote down a description of the bird in detail. A couple of days later I was able to look it up with Mr. A. C. Bent and found that it was a male Barnacle Goose (*Branta leucopsis*) in fine plumage. It was then too late to secure it as a specimen. Mr. Hutchinson reported later that when he plucked it one wing seemed to have been badly bruised. It is quite likely that it had struck one of the numerous guy wires or ropes about our plant during the night, as it was flying by. This would account for its presence, alone, on our small pond which is but 450 feet. long and situated about six miles inland from the Great South Bay.—F. C. Willard, *Farmingdale, L. I.*

Snow Goose in the Cayuga Lake Basin.—On January 30, 1923, the coldest day of the winter, while watching a flock of about 30 American Crossbills feeding on Tsuga seeds along Six Mile Creek, Ithaca, N. Y., a flock of six wild fowl was spied flying up the stream. As the birds drew closer it was seen that they were Snow Geese, *Chen hyperboreus* (*nivalis?*) The Geese, traveling about twice as high as the trees, were in a broken V-formation in marked contrast to an irregular mob of Herring Gulls that had passed by shortly before. The sun shone full on the birds as they went overhead and made the white plumage contrast greatly with the primaries, which appeared to be coal black. The wing beats were slower than those of an American Merganser, but somewhat faster than those of a Canada Goose. In comparison with a Duck the necks seemed long and thick, and the tail long. The writer had a very satisfactory view of these Geese. Mr. E. H. Forbush recorded a flock of Snow Geese on the New England coast during the same cold spell.

The only other published record that I find for the Cayuga Lake Basin is that of two young birds that were killed near Ithaca, during the last of March, 1876, (see Forest and Stream, Vol. 7, p. 283; also Reed and Wright on The Vertebrates of the Cayuga Lake Basin in the Proc. Am. Phil. Soc., XLVIII, 1909, p. 416.)

Eaton, in his 'Birds of New York,' gives but six records for the mainland of New York, and eleven for Long Island, the latest being 1903. I have not found any later records than this one of 1903.—Thomas Smyth, *McGraw Hall, Ithaca, N. Y.*

Baird's Sandpiper in Dutchess County, N. Y. with Remarks on its Identification in Life.—On September 9, 1922, Messrs. M. S. Crosby, Allen Frost, and I went to Morgan Lake, just outside of Poughkeepsie, to try and find some Shore-birds, as the lake had been allowed to run dry, leaving several acres of mud flat and we were not disappointed. As we approached from the north a large flock of mixed species flew away, leaving one solitary individual behind. A careful study of this bird at fifty yards through high powered binoculars convinced me that if indeed it were possible to identify a Baird's Sandpiper in life with absolute certainty, the bird before me was that species. Fortunately the means of proof were at hand. The specimen was promptly collected, and proved to be an adult female Baird's Sandpiper. This is apparently the first record for the Hudson River Valley. The skin is in the American Museum of Natural History.

Few groups of birds are more difficult to determine accurately in life than our smaller Shore-birds. With the species under discussion I had awaited for years the opportunity of proving that this could be done. To some it may seem unfortunate that collecting the specimen is the only possible proof, but I know of no other that is absolute with birds of such obscure patterns. If one pronounces a certain bird before one to be a certain species in a certain plumage, and the bird is collected, and proves

to be that species in the plumage stated, he who claims that it cannot be identified in life has an exceedingly weak case. On two previous occasions I have been convinced that I was looking at a Baird's Sandpiper, but neither time could I prove that identification was possible.

In my opinion a satisfactory identification of Baird's Sandpiper is possible for a student who knows the Pectoral and White-rumped Sandpipers well, who can describe the *exact pattern of coloration* both above and below of all three from memory, and who has practised looking at skins of all three side by side from *various distances approximating* those reasonably to be expected with living birds. Needless to say those who most glibly state that this or that bird is impossible to identify in life never dreamed of taking this trouble. Above, Baird's and the White-rumped are almost identical, but the former is more uniformly colored, of a grayer cast, especially on the head, which is practically unmarked with darker. The latter is of a browner cast, with a distinctly streaked head, the feathers of the back and scapulars distinctly edged with whitish. One has white upper tail-coverts, the other fuscous. The Pectoral is blacker and browner than either, with heavy black streaking, especially noticeable on the crown, and blackish tail-coverts. Below all three have an immaculate white chin. The throat and breast of the Pectoral have a brownish cast, with distinct fine blackish streaking, abruptly succeeded by the white belly.

In the White-rumped these parts are white with less distinct and less extensive dark grey streaking and spotting, the spots tending to run down the sides of the breast and flanks. In Baird's these parts are buffy with (adult) or without (immature) indistinct darker streaking. In practise, of course, the White-rumped can sooner or later be eliminated by its white upper tail-coverts. Were it not for this character, separating out a Baird's Sandpiper would be almost impossible, as the color pattern of these two species is much more alike, than Baird's and the Pectoral. In life distance serves to accentuate the darkness of throat and breast contrasted with the white belly, and an adult Baird's seems dark enough below to be a Pectoral. Here experience is essential. The observer must have seen enough Pectorals to know that that species is really even darker below. The much darker crown of the Pectoral is also an excellent check. The immature Baird's, with no visible streaking below, is a much easier proposition, as the breast never has the same dark effect. Returning to our flock of Shore-birds on Morgan Lake, one immature Baird's Sandpiper was subsequently studied at leisure with Pectoral, Least and Semipalmated Sandpipers.—Ludlow Griscom, *American Museum of Natural History.*

The Passenger Pigeon (Ectopistes migratorius) in North Carolina. In recently going over some old family papers and letters I have found the following references to the Passenger Pigeon, which have interested me, and which may interest others.

In a brief sketch of his life written by my father, Francis Raymond Holland, not long before his death, which occurred on May 21, 1894, I find the following.

"In my childhood" [my father was born in 1820] "there were many miles of unbroken forest adjoining us." [His father's plantation was a few miles north-east of Salem, now Winston-Salem, Forsythe County, N. C.] "Between us and Salem there were only a few houses. Deer and squirrels were plentiful. Wild Turkies, Ducks," [the plantation was intersected by a beautiful stream, upon which was a large mill-pond] "and Ruffed Grouse were abundant. *Immense flocks of Wild Pigeons came and alighted on the oak-trees nearest our house.* All small birds were protected, and there were few species native to that region with which I did not early become acquainted, and the habits and traits of which I was not taught to observe. From the love of nature, thus early acquired, I have through all my life derived untold pleasure."

In a letter to my father, who at the time was a Moravian missionary in Jamaica, my grandfather, William Holland, writing from the old plantation under date of February 21, 1842, says: ". . . We flattered ourselves that we should have some Wild Pigeons this winter, but as yet we have no prospects. About New Year's there were a good many flying, but they did not stop here. In the upper edge of Surry County, about fifty miles from Salem, and eight or ten this side of the Blue Ridge, they had a great roost, said to be about four miles square, and they were so thick that they broke the timber. People who were there said it was the greatest roost, which they had ever seen. They roosted seventeen nights at one place. There was a company which went from Salem, but they were too late. The same morning they started from Salem, the Pigeons left and flew over the mountains. William Winkler was there the last night. He had gone a few days earlier to visit his brother-in-law, Levi Fisher. He went with him to the roost. The boys have a tale on him that he killed fifteen at one shot and heard them fall, but could find only *one*. However, he brought about one hundred and twenty home. Last week, after the snow, there were a few about here, but it was not worth while to go out after them. There were a good many acorns in the fall, but the hogs have gotten pretty well through with them, so that we cannot expect the Pigeons to make any stay, if they should come again."

I may say that in my own boyhood in North Carolina from 1858 until the fall of 1863, I occasionally saw small flights of Passenger Pigeons about Salem. In 1865, (I think I am right in the date) I remember seeing them for sale in the Philadelphia markets. They had been shipped in barrels from the west, probably Indiana, or Kentucky.

As late as 1870 I saw a few scattering flocks in Bartholomew County, Indiana. I remember in the fall of that year riding out into the country one day with my father in the vicinity of Hope, Indiana. He exclaimed "Look there! There goes a flock of Passenger Pigeons!" There were about thirty in the flock. They alighted upon the top of a very tall ash, which had been girdled, and was standing leafless at the edge of a clearing in the forest. We reined up and counted the birds and watched them moving about on the branches. Presently they rose and streamed away

in their arrow-like flight. These were the last Passenger Pigeons I ever saw upon the wing.

The bird is extinct. Once there were millions of them. We have half a dozen specimens dried in the Carnegie Museum, which I made haste to acquire when I became the Director, and which now it would be impossible to secure for love or money.—W. J. HOLLAND, *Director Emeritus Carnegie Museum, Pittsburgh, Pa.*

Mourning Dove at Cap Rouge, Quebec.—On April 12, 1922, I killed a Mourning Dove here (*Zenaidura m. carolinensis*), when the Song Sparrows had not yet arrived. Mourning Doves are very seldom seen in this part of Canada, and I do not believe that there are half a dozen authentic records of their occurrence. On the above mentioned date snow covered the ground everywhere and there were good sleigh roads for eleven days afterwards. Cap Rouge is situated along the St. Lawrence river, some nine miles west of Quebec city.—GUS. A. LANGELIER, *Cap Rouge, Que.*

Breeding of the Goshawk in Massachusetts.—The writer takes great pleasure in reporting the taking of the eggs and nest of the Goshawk (*Astur a. atricapillus*) on April 28, of the present year in Petersham, Massachusetts. This is the first record for the State. The eggs and nest were given to Col. John E. Thayer of the Thayer Museum at South Lancaster by Prof. R. T. Fisher of the Harvard Forest at Petersham, the fortunate finder of the Goshawk's nest.

When the writer found last summer (July, 1922) in an out-door cage in Petersham a full-grown young Goshawk which had been taken from a nest in the vicinity, it was evident that the discovery of another nest of the species in the town was only a matter of waiting until another spring. Hence it was no surprise to get word late in April of this year from Prof. Fisher at Petersham that he had found the Goshawk's nest. This was on April 21, while Prof. Fisher, with four of his assistants, was engaged in forestry work in an extensive coniferous wood lot.

Prof. Fisher sent news of his find to Hon. Herbert Parker and the writer and a week later (April 28) we, together with Miss Edith Parker, went to the nest. With us were Prof. Fisher and Messrs. Paul W. Reed, E. E. Tarbox, A. C. Cline and P. R. Gast, his companions of the week previous when the nest was found. The day was very rainy and the bare undergrowth and the mossy ground were so thoroughly soaked that not a footfall nor a snapping twig was heard. The nest was so large that no part of the large Hawk was visible, but the blow of an axe into the pine sent the bird off. A temporary bad knee prevented the writer from climbing the tree, but Mr. Reed, a born climber, put on the irons and went up the wet tree and sent down both eggs and nest—the latter in perfect condition. The Hawk and her mate circled steadily overhead. Both scolded. Their cries were decidedly accipitrine but not much louder than the Cooper's Hawk's *cucks*. They were, however, wholly different and may be written *kwee-kwee-kwee*, with a tinge of harshness impossible to express in words.

The nest was of enormous size but wholly new and hence free from woods dirt. It was over 5 feet in length, 2 feet in breadth and 1 foot in depth. It was very compactly made of sticks (mostly white pine and hemlock), many of them long and large; and it had a coniferous bark floor in its very slightly hollowed interior. Quite a number of the longer and slimmer branches had green pine-needle bunches, but they were worked into the body of the nest, showing that they could not have been added recently. The fresh fractures of many sticks showed that the Hawk had broken them from living trees. It was the most beautifully constructed large Hawk's nest that I have ever seen. The nest was placed on horizontal limbs and against the trunk of a white pine of almost 2 feet diameter. It was up 55 feet—two thirds the height of the tree. The three eggs were pale blue and were heavily incubated. Their measurements were 2.06 × 1.50; 1.96 × 1.53; 1.93 × 1.48 inches.—J. A. Farley, *52 Cedar St., Malden, Mass.*

Long-eared Owls Wintering at Evansburg, Pa.—On March 3, 1923, I found a large colony of Long-eared Owls (*Asio wilsonianus*) wintering in a dense growth of pines and other coniferous trees growing along the Skippack Creek at Evansburg, Pa.

No less than fifty of these birds were congregated in this grove.

I was working my way slowly through the trees, when I came upon nine of these Owls at close range. As I did not wish to disturb them I backed slowly away, but right in to the main colony where I saw five or six Owls on every tree around me.

The ground under the roosting trees was covered with pellets ejected by the birds. The Owls not having been molested in their dark retreats were very tame. On March 10, with Mr. Richard F. Miller, I made a second visit. The Owls at this time were very restless and shy, and flew about in all directions as soon as we entered the grove but did not fly far.

A farmer who owns this grove told me the Owls came around in the Spring at dusk after his young chickens and he had shot several of them.

This may have been one of the larger Owls although I have never found any of them in that locality, except the Barn Owl.—Wm. Jay, *Mt. Airy, Phila., Pa.*

Pileated Woodpecker in Connecticut and New Jersey.—On September 8, 1922, at Cornwall, in the northwestern corner of Connecticut, on Yelpin Hill, I heard and saw a Pileated Woodpecker. I first heard him call much like a Flicker but with a curious drop at the end which made me think that it might be a Pileated. I finally located him with my glasses a long distance off and saw his crest and a little later he flew over my head with the flapping flight of a Pileated. A little farther along on the mountain that day I saw a Cape May Warbler and a Short-billed Marsh Wren which are both rare migrants for me in that part of Connecticut. The Pileated Woodpecker has not been reported from Cornwall since December, 1900, although it has been found breeding on May 30, 1901, at Torrington and in 1896 near Litchfield, Connecticut.

On May 12, 1912, I located the nest of a Pileated Woodpecker at Newton, New Jersey in the stub of a dead hickory thirty-five feet from the ground. The bird was first seen by Mr. George H. Stuart and afterwards by Mr. Julian Potter and myself. Shortly after I located the nest the bird came back, circled around the tree several times, flying away each time and finally entered the nest hole while we were at a distance of only some thirty feet from the tree. We were unable to dislodge her until I climbed the tree nearly up to the nest. Owing to the decayed condition of the upper part of the stub and the fact that we had no hatchet we were unable to determine whether she had eggs or young birds. We heard the male several time but did not seem him. The call of the Pileated was much like that of a Flicker but the notes were less rapid, wilder, sounding more like a series of clucks with a curious quirk at the end. The note of the male has a different cadence from that of the female. Two old nests were also found. The owner of the land where the nesting tree was located, reported that the bird had nested there for two years past. It very rarely occupies the same nest twice.—SAMUEL SCOVILLE, JR., *Pennsylvania Bldg., Philadelphia, Pa.*

The Red-naped Sapsucker in Oklahoma.—While on a collection trip in Pittsburg and Latimer Counties, Oklahoma, I collected a male specimen of *Sphyrapicus varius nuchalis*, March 23, 1914. The true identity of this specimen escaped my notice until sometime ago when I began a paper on Oklahoma Woodpeckers. Later Dr. H. C. Oberholser identified the specimen as *S. v. nuchalis*. So far as we are aware, this is the first recorded instance of the occurence of this bird in Oklahoma. This specimen is in the museum of the University of Oklahoma, and bears accession number 14, n.s., and field number 131.—E. D. CRABB, *Univ. of Oklahoma, Norman, Okla.*

Another Three-toed Woodpecker in Michigan.—Among some skins which I acquired about two years ago, is a male Three-toed Woodpecker, (*Picoides americanus americanus*) collected by Mr. C. F. Brandler at Amasa, Iron county, Michigan, on November 24, 1910.

I know of only three other published records of the taking of this species in Michigan. (See Auk, Vol. 30, 1913, p. 272; and Vol. 38, 1921, p. 274 and p. 283.)—STEPHEN S. GREGORY, JR., *345 Barry Ave., Chicago, Ill.*

Observations on the Habits of the Whip-poor-will (Antrostomus v. vociferus.)—The following observations on the Whip-poor-will were made at Lakeville, Plymouth County, Mass., during the years 1900 to 1902 and are transcribed from notes made at the time. The birds were common there and the writer was living on a large farm under conditions especially favorable for observation.

In 1900, the first arrival was recorded May 5, when a bird came and sang on the door-step, and they at once became common. In 1901, on the evening of May 4, about eight o'clock, a single bird was heard singing.

This was the first arrival noted and no others were heard that evening. At two o'clock the following morning, six hours later, I was awakened by birds singing loudly everywhere. I dressed and went out and for more than an hour the chorus continued. There were numbers of birds about the house, on the door-step and ridge-pole, others singing in the road or from the stone walls along the road side, while still others could be heard down in the pastures,—often eight or ten were singing at the same instant. I walked down the road for a half mile and the birds seemed equally as abundant on neighbors' farms. It seems probable that the migration takes place at night as these birds had just arrived. In 1902, the first arrivals were earlier, April 30.

The Whip-poor-will sings most continuously from dusk till about 9.30 p. m. and from 2.00 a.m. till dawn. During the intervening hours only an occasional song is heard. The song season lasts from their arrival in spring until late July or early August. Then there is a marked falling off in the number of singing birds heard until toward the end of August or early in September an increase in the number of singers is again noted. The songs of these late birds often lack the energy that characterizes the spring performance but a good many continue to sing until they leave for the south. My latest singing bird was noted September 24, 1901.

A certain fence along the roadside was a favorite singing station during 1901. During the month of June, I spent the early part of a number of evenings watching them. June 15 a Whip-poor-will alighted on the fence and uttered its "chuck" note, which usually precedes the regular song, repeating it a number of times but not giving a note of the usual "Whip-poor-will" call. It also did the same while on the wing. This bird was supposed to be a female as no conspicuous light area was visible on the tail. If so, she was capable of singing the same as the male for I later heard and saw her sing, both from the fence and while on the ground in the middle of the road. She finally flew and was followed by another bird which may have been her mate.

Some of the birds had a regular route that they followed each night with certain favorite spots where they stopped to sing and each station was visited in regular order. One bird, that I watched and listened to for a number of successive evenings, was always first heard, just at dusk, from the bars between two pastures about fifteen hundred feet to the south of the house. Here he sang several times with intervals between, then crossed the road and flew to a spot, on a stone wall that bordered a wood lot, eight hundred feet east of the house. From this singing station he went direct to a rail fence closer to the house and between it and a peach orchard. After singing a number of times he then would fly to a stone wall by the side of the road and from this latter station always returned to the pasture. The time taken to make this circuit varied from 25 to 35 minutes. I watched this bird from several places of concealment and ascertained to my satisfaction that it was the same individual that visited each of these places and that the order given above was not varied. The spot from

which he sang was, in all cases, nearly the same, i.e., within a very few feet of the place where he was seen on a previous evening. Between intervals of singing he sometimes flew into the air after insects returning again to the same perch. At other times he remained motionless between songs. Sometimes the song would be broken off abruptly and the bird would take wing and capture an insect. In such cases, after returning to his perch, he usually remained silent for a while.

After it became too dark for satisfactory observation, I frequently heard a bird sing again from some of these stations but I never was able to determine if he made a second circuit of his singing stations during the same evening. I doubt if he did for the reason that the door-step bird never sang from there more than once during an evening. Another individual was quite punctual in the time of his arrival and we made it a practise during the early summer to watch for him each night. Within a few minutes of 8.30 he would be heard singing just outside the door. It is probable that the insects attracted by the light streaming from the windows induced him to come so close to the house.—F. Seymour Hersey, *Taunton, Mass.*

Gray Kingbird (Tyrannus dominicensis) at Cape May, N. J.—While a party of members of the Delaware Valley Ornithological Club were exploring the meadows and dunes at Cape May Point, at the mouth of Delaware Bay, we were attracted by a bird which flew out from a growth of wind swept and half dead Red Cedars on Pond Creek Meadow. It dashed out into the air seized an insect and returned to its perch. It had all the action of a Kingbird and such we supposed it to be. But when a dozen glasses were leveled at it we saw to our surprise that the bird lacked the characteristic white tip to its tail; the upper surface was found to be gray and in addition a dark line extended through the eye like that of a Shrike though broader and not so distinct. In actions and general appearance the bird was like our ordinary Kingbird. He made no sound of any kind while under observation. We were trying to place the bird when some one produced one of those ever ready bird identifiers, Reed's 'Pocket Bird Guide,' and turned to the Kingbird and there on the opposite page was the Gray Kingbird. The bird in the tree was compared with the picture in the book and was found to be identical in every detail. For further confirmation a description was written and sent to Dr. Witmer Stone with the question attached "What is it"? The answer came back the next morning over the wire "Gray Kingbird." Several of those who saw the bird examined skins the next day at the Academy of Natural Sciences at Philadelphia and further confirmed the identification. This is the first record of the species for New Jersey and, we believe, with one exception the first record north of South Carolina.—Julian K. Potter, *Camden, N. J.*

The Starling in Norfolk, Va.—On January 21, 1921, at Campostella Heights, a suburb of Norfolk, my attention was attracted by the clear

whistle of a bird, which I at once recognized as the note of a Starling, and soon located it in the top of a dead pine on the edge of a grade. On January 30, two Starlings were noted and on February 17 nine Starlings were feeding in our back yard. The ground was covered with snow, six inches deep, and the temperature was ten degrees above zero. During March from two to four Starlings were seen almost daily in the nearby pines, and seemed very much interested in several Woodpecker holes in a dead pine stub, and on March 27 a pair had selected a hole about 30 feet up, and were carrying nesting material.

Incubation began about April 4, and, on April 28, I first noticed the male bird carrying food to the nest. Both birds took their turn at incubating. The male bird seemed to do all the feeding, until the young were old enough for the mother to leave them, then the duty of feeding the young was turned over to her and all he did was to fly back and forth or sit in the top of a dead pine and whistle, chatter, and flap his wings, somewhat after the manner of the Boat-tailed Grackle. A second brood was raised in another hole about 50 feet up, and on June 2 the old birds were feeding the young. On June 25, about nine o'clock, two young birds left the nest, and were led out of the grove by the old birds, and over the fields out of sight. The flight started right from the nesting hole. During all of the fall, Starlings would gather in a dead pine, on the edge of the grove, within 80 ft. of our back door, about two hours before dark, and remain until time to go to roost. I have been unable to locate their roosting place, as they flew over the river, and out of sight over the city of Norfolk. They did not gather in the pine in a flock but came singly, by twos or several at a time. They seem to gather to have a good sociable time, before bed time, to judge from the chattering, whistling, and mocking of other bird notes and calls. The largest flock noted was on the evening of October 31, when 32 were in the pine at one time. It might be of interest to state that a pair of Sparrow Hawks had selected a nest place in a hole at the top of the same pine stub in which the Starlings were nesting, but were so persecuted by a pair of Fish Crows, which had their nest in a live pine close by, that they left the grove.—Jos. E. Gould, *Campostella Heights, Norfolk, Va.*

Notes on a Sparrow Roost, and the Arrival of the Starling in Wisconsin.—The writer has watched with considerable interest a certain English Sparrow roost near the Zoo in Washington Park, Milwaukee. Sparrows from a large area (their line of flight has been followed a mile and a half in one direction) have roosted the latter part of each summer with large numbers of Robins, Purple Martins and Grackles in a small grove of deciduous trees.

After their companions go south and the leaves fall, the Sparrows normally transfer their roost to a number of small evergreens nearby, which offer considerable shelter from the elements.

Late last fall for some unknown reason Sparrows to the number of a thousand or more started roosting in a number of small maples and elms in the same vicinity, where they perched hundreds to a tree-top, fully exposed to the cold and wind.

The fall and early winter weather was comparatively mild, however, with few cold snaps, and the Sparrows were observed each morning, occupying their exposed roost, apparently suffering little or no loss of life. This seemed rather remarkable considering the sheltered spots usually selected for passing the nights at this season, and proved that sometimes at least, they can stand much exposure. At the same time my friend, Mr. W. I. Lyon, of Waukegon, Illinois informs me that Sparrows died of exposure if left in his traps any considerable length of time.

February brought the first really severe cold, the temperature dropping to twelve degrees below zero some nights, accompanied by a biting wind. It seemed impossible that the Sparrows could endure such weather in their exposed position, and indeed the "roost" started to break up at this time, the sub-zero weather and high winds two weeks later causing the last of them to seek sheltered nooks wherever they could. The bountiful food supply of cracked corn and other grain around the Zoo, to which these Sparrows have access, may account for their extraordinary resistance to the cold, starvation being the greatest enemy they have to fear.

On the morning of February 17, 1923, after a bitterly cold night, the writer picked up a beautifully plumaged male Starling (*Sturnus vulgaris*) from the ground beneath the roost. The close proximity of the Zoological Park suggested the possibility that the bird might have escaped from captivity, although its perfection of beak, feet and plumage indicated that it was a wild bird. Subsequent inquiry brought out the fact that no Starlings had been confined here in recent years.

Additional proof that these birds had really arrived reached us on March 14, when Mr. George W. Paine, of Whitefish Bay, one of Milwaukee's northern suburbs, brought to the Museum another male specimen in perfect plumage.

This bird was captured on the evening of the 12th, as it sought refuge in a woodpile from the violence of the worst blizzard of the season. It died two days later. Like the other, this specimen was much emaciated, apparently unable to stand the hardships to which it was exposed. This is scarcely to be wondered at however for the severe weather of February and early March, when one blizzard followed another, with high winds and deep snow, took a fearful toll of even hardy native species.

These are the first records for Wisconsin and extend the known range of the Starling about three hundred miles from the vicinity of Cleveland, Ohio and Port Stanley, Ontario, the most north westerly points from which the species has been previously reported. These localities are in about the same latitude as Milwaukee and also on the shores of the Great Lakes. The Starling's partiality for the proximity of large bodies of water, as indicated by its spread on the Atlantic coast, may also attract it to our shores, and account for its early appearance here.

The fact that Red-winged Blackbirds, in some cases in flocks of considerable size, spent the early winter in southern Wisconsin, may also have some bearing on the Starling's arrival as they are known to wander about together at times.—HERBERT L. STODDARD, *Public Museum, Milwaukee, Wis.*

The Starling (Sturnus vulgaris) Breeding at Hatley, Quebec.—Undoubtedly this is the first recorded instance of the Starling breeding in the Province of Quebec, and perhaps also in the Dominion of Canada. The first bird to invade the village of Hatley was noticed by me at 5.30 p.m. on April 14, 1923. Five days later, I saw it again near the same spot, and then lost sight of it until the 29th. On this latter date, it was in the company of a mate, both birds allowing of a near approach, whilst feeding on the ground in a field at the back of St. James' Cemetery. I visited this spot several times without results, until May 17, when one of the birds was seen to rise off the ground with food in its bill, and fly direct for the spire of St. James' Church. I watched it through my glasses, and noticed that it entered the base of the hollow round wooden ball at the top of the spire (on which a cross once stood), thereby revealing the whereabouts of its home. Poor old English Starling! you never asked to be imported into the United States, but you did well when first visiting Hatley to seek the sanctity of a church, where so far as I am concerned you are immune. Even if I took toll of you, what would it amount to, seeing that you have made up your mind to invade Canada, as will be gathered from the following records, viz.:

1919, St. Catherines, Ont., Mrs. R. W. Leonard, small flock during winter.
1920, Aug. 24, Toronto, Ont., J. H. Fleming, flock of seven.
1921, May 15, Port Stanley, Ont., E. M. S. Dale, three along lake front.
1922, March 11–12, Magog, Que., F. Napier Smith, one (taken).
" Apr. 19–20, Arnprior, Ont., Chas. Macnamara, one (taken).
" Port Stanley, Ont., E. M. S. Dale, again reported during the summer.
" Sept. 29, Wheatley, Ont., W. E. Saunders, three.
" Oct. 22, Aylmer, Ont., seven.
1923, Feb. 18, London, Ont., E. M. S. Dale, seventeen (several taken).
" Apr. 14–May 31, Hatley, Que., H. Mousley, two (breeding).
1923, Apr. 21 and later, St. Lambert, Que., L. M. Terrill, three.

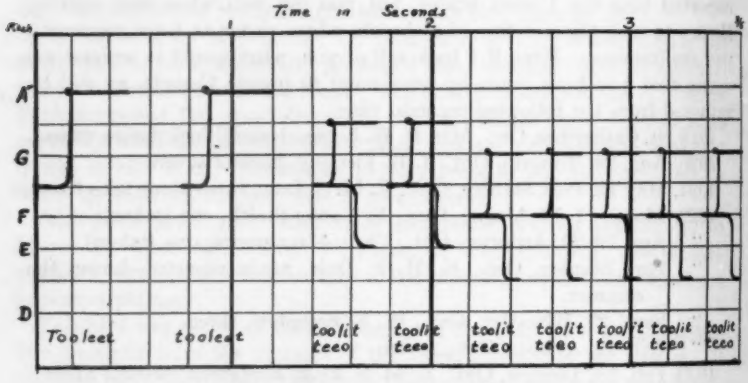
St. Lambert the most northerly station so far recorded, is about 325 miles north of New York City, the point of liberation of the Starling in 1890.—HENRY MOUSLEY, *Hatley, Que.*

A Double Song of the Cardinal.—In studying the details of bird songs one frequently finds cases where birds sing notes that are on two distinct pitches. In most cases one pitch is louder than the other or heard only from certain positions, which leads one to suspect that it is merely the effect of overtones. In the summer of 1921, however, I heard

a song from a Cardinal that contained double notes, where the double was so distinct and clear that it could not have been due to overtones.

The locality was Limestone Brook in the Allegany State Park, Cattaraugus County, New York. On July 23, I was much astonished to find a pair of Cardinals. I had just been looking at Juncos and Magnolia Warblers and listening to the songs of Hermit Thrushes, so that the mere presence of this southern bird among northern species was an event worth recording. Wishing to make the male sing I began whistling bits of Cardinal song as I remembered them, and though the imitation was far from perfect it accomplished its purpose. The bird was soon not ten feet over my head and whistling at its best.

I recorded, one after another, six different songs. The bird obligingly repeated each one frequently enough so that I could get it accurately and test the pitch and time of each portion. The presence of clearly marked consonant sounds in the song was characteristic. I have previously explained how I represent liquid consonant sounds by the graphic method ('Auk,' XXXII, p. 179). Other consonant sounds, that are less common in bird music I represent by writing beneath the record the syllables that the bird actually seems to sing.



DOUBLE SONG OF THE CARDINAL

Among the six songs was one that I had written "Tooleet tooleet toolit toolit toolit toolit toolit toolit toolit," and another "Teeo teeo teeo teeo teeo teeo teeo." Suddenly the bird put these two songs together singing them both at once in perfect harmony. The first two or three times that the bird did this I was unwilling to believe what I had heard. Several times I thought my ears had deceived me, but when I listened again there were the two songs together, sounding just as though two birds, a soprano and contralto were sitting side by side and singing a duet. The bird sang this double song over and over as if to convince me that it really could do

it. As the record shows the song opened with two single "tooleet" notes. Then the "teeo" part joined in with the "toolit." The phrases began on the same pitch, but the "toolit" slurred upward and the "teeo" down. The "toolit" contained a liquid consonant sound, but the "teeo" did not. Perhaps most wonderful of all the "toolit" phrase remained on the beginning note a shorter time than the "teeo." Neither song was louder than the other and there was no suspicion that one could be an overtone of the other.

It must be physically impossible for a single vibrating organ to produce two distinct sounds at once unless one is an overtone of the other. I would therefore infer that the Cardinal has two or more vibrating organs in its throat and is capable of using each independently of the other. Whether this is a common phenomenon of the Cardinal song or this individual was an unusual bird I do not know, having little acquaintance with the song of the Cardinal as a species. Perhaps someone who lives in the range of this bird and has a more intimate acquaintance with its song could settle this question.—ARETAS A. SAUNDERS, *Fairfield, Conn.*

Dickcissel in Central Park, New York City.—The noon hour of October 4, 1922, found me on the top of a steep rock, looking down into a certain grape vine tangle on the edge of the Lake in the Ramble. Fourteen years ago I flushed a Horned Owl out of this very tangle, and ever since have religiously peeked into it in the fatuous hope that lightning would strike a second time in the same spot, and that another rare bird would be discovered. On the day in question a flock of English Sparrows seemed an inadequate return for my efforts, but one started working its way upward, and finally emerged on top to view the scenery. It was pure chance which caused me to put my glasses on it, revealing a yellow breast dark loral streaks, and a bay patch on the bend of the wing. I was so astounded at beholding an adult female Dickcissel in winter plumage, that I almost fell off the rock into the lake. A few minutes' study of a bird with which I was previously thoroughly familiar in life, and I rushed back to the Museum to secure witnesses of so improbable an occurrence, as the locality made collecting out of the question. Most fortunately my ever obliging friend, Mr. J. T. Nichols, who also knew the bird well in life, consented to return with me. A half hour's search, and we found it with a flock of English Sparrows in a patch of rag-weed. It seemed to have absorbed the tameness of the Sparrows, as we were able to observe it at leisure on the ground in bright sunlight at a distance of fifteen feet. Perhaps few students of the Atlantic Coast realize the astonishing resemblance of this bird in fall plumage to the female English Sparrow. With a front view, of course, the yellow breast and loral streaks are very noticeable, but the bay at the bend of the wing is only visible at very close range. I do not believe the two species could be separated on a back view in life. The harsh "*cack*" of the Dickcissel is, of course, very different from the "*cheep*" or chatter of the Sparrow. Our bird was in sleek, unfrayed plum-

age, was able to fly perfectly, and showed no signs of being an escaped cage-bird, a contingency indeed as remote as its occurrence on the Atlantic Coast. It is a very interesting coincidence that Mr. Henry E. Childs ('Auk,' April, 1923, p. 330) records a Dickcissel in Rhode Island last December, also associating with English Sparrows. In this region occasional specimens were recorded between 1875 and 1890. Fourteen years later Mr. Waldron De Witt Miller made the astonishing record of a breeding pair near Plainfield, New Jersey, which ended the local history of this species.—Ludlow Griscom, *American Museum of Natural History, N. Y.*

Habits of the Northern Shrike in Captivity.—Bird banding is proving to be a medium through which the bird bander is securing facts and enjoying intimacies with birds that might otherwise not be obtained.

The following experience of Miss Lottie M. Smith of South Sudbury, Mass. is illustrative of the delightful, unexpected experiences that go with the work.

Like others who operate a banding station throughout the entire year, she has had one or two visits from Northern Shrikes (*Lanius borealis*) that were attracted to the trap by the Juncos, Tree Sparrows, Purple Finches, Chicadees and other winter birds who enjoy her food and protection. On two occasions, due to a scarcity of food in the severe winter just past, Shrikes entered the trap in pursuit of birds, and were removed and despatched. Upon the third occasion the Shrike, finding itself trapped, bent all its energies to escape and, contrary to the actions of the other two, did not molest the banded Tree Sparrows which it entered the trap to seize.

This Shrike was removed, placed in a cage three feet in height and set in a large unused room with a southern exposure beside the window. Unless the day was unusually cold or stormy, the window remained open and this was the home of the bird from March 1, to April 7, 1923.

The first food offered the captive was flies and meal worms but these it spurned and would not touch. Two dead Juncos were readily devoured with most of the feathers but when a dead Shrike was offered the head was snapped off and the body remained untouched. It was observed that when the bird was hungry it consumed more of the feathers and undigestible parts of its victims than when its hunger was not so keen. Raw beef, of course was quite acceptable and this at first was chopped into small bits but later was fed in bulk. Before partaking, the Shrike pulled off the fat and deposited it in a saucer that contained its drinking water. This trick appeared intentional for while it ejected pellets about the floor of its cage the fat was always deposited in the saucer. Pork and lamb were as unacceptable as beef was acceptable and the Shrike preferred the latter uncooked but if sufficiently hungry would eat the cooked meat. This and all other food was impaled on its cage and torn bit by bit. Mice were its favorite food and the heads were devoured first—the remainder was left hanging from the cage, sometimes all day, before it was touched

again. Rats were tried but the largest frightened the Shrike and the smallest remained unnoticed until cut into pieces and the skin removed.

The Shrike became gentle, could be handled and at times was permitted to fly about the room though if anyone but its keeper came near it showed signs of excitement and fright. As the weather grew warmer and the time to migrate approached the bird's restlessness increased and on April 7, wearing band number 69316 on its leg, it was taken to Devereau Beach and released.—CHARLES B. FLOYD, *Auburndale, Mass.*

The Prothonotary Warbler at New York City.—On the afternoon of May 13, 1923 I observed a Prothonotary Warbler (*Protonotaria citrea*) in the Botanical Garden, Bronx Park, New York. I saw the bird again about six o'clock the next morning as well as shortly before sundown the evening of the same day and I also saw it on both of the following days early in the morning. I observed the bird for long periods at a distance of only thirty-five feet with a pair of twelve diameter binoculars so that there was absolutely no question of the identification. In addition to this, I pointed the bird out to several other observers and during the course of the four days, it must have been seen by twenty or more all of whom concurred in the identification. I think that this is the first record of the Prothonotary Warbler in Bronx County.—CLIFFORD PANGBURN, *New York City.*

Bay-breasted Warbler at Atlanta, Ga.—On May 6, 1923, I had under observation for some time, a Bay-breasted Warbler (*Dendroica castanea*). Under powerful field glasses at a distance of only about thirty feet the chestnut markings of the throat, upper breast and sides, the dark forehead, light colored cheeks, wing bars, and white belly were all plainly seen and examined. There was also a Black-poll Warbler, its close relative, not far away. As the Bay-breast is supposed to migrate farther west, up the Mississippi valley, and supposed to be rare south of Virginia, I take pleasure in adding this species to my Atlanta and vicinity list. —EARLE R. GREENE, *108 Orme Circle, Atlanta, Ga.*

Yellow-throated Warbler again at Cape May, New Jersey.—On May 30, 1923 a number of members of the Delaware Valley Ornithological club including the writer went to Cape May on the annual Memorial Day field trip. We were approaching a small group of pine trees near Cape May Point when we were attracted by a song coming from among the trees which might be described as being half way between that of a Yellow Warbler and an Indigo Bunting. We searched some time for the songster without result and had about decided that it really was a Yellow Warbler with a freak song when Mr. John Gillespie, a member of the party, found the bird and announced that it had a back about the color of a Myrtle Warbler. At this moment the bird flew out and lit in another group of pines on the far side of a little lake where it continued to sing as before. Hurrying around the lake we soon located the bird, which proved to be a Yellow-

throated Warbler. It was in the bright plumage of the adult male and identification was further verified by one member of the party who had become familiar with this species in Virginia. It was in almost the exact spot where Dr. Witmer Stone secured a specimen of the same species on July 15, 1920.—JULIAN K. POTTER, *Camden, N. J.*

Bewick's Wren (Thryomanes bewicki bewicki) in Clarendon County, S. C.—On the morning of October 10, 1922, I saw in my back yard a specimen of Bewick's Wren (*Thryomanes bewicki bewicki*), and positively identified it. My home is five miles from Summerton, S. C. When first seen the bird was on the ground by the side of an old vine-covered fence; then it hopped along the fence and finally flew into a dense thicket of plum bushes, where I lost it.

This is the only specimen of this species that I have ever seen in Clarendon County; the bird is rare or local in eastern South Carolina and there are only three or four records for the coast region.—E. VON S. DINGLE, *Summerton, S. C.*

Blue-gray Gnatcatcher in Dutchess County, N. Y.—On Sept. 10, 1922 there was a memorable flight of Warblers and other passerine birds near Rhinebeck. We observed 81 species, including 18 species of Warblers and two Philadelphia Vireos, one of which was collected. One particularly large flock of Warblers, Vireos and small Flycatchers was found in a big patch of birches. While looking this flock over, a familiar little figure with a very long tail was discovered, whisking around in the top of a pin oak tree, and further inspection revealed an undoubted Gnatcatcher. As this was the first county record, and the second for the Hudson River Valley, away from the coast, the specimen, a female, was collected, and is now in the American Museum of Natural History.—MAUNSELL S. CROSBY, ALLEN FROST, AND LUDLOW GRISCOM.

Wheatear at Godbout, Quebec.—Some days ago looking over some old notes—I found some on *Saxicola oenanthe*, which may interest many of your readers, and some one may have data which may answer some questions that have puzzled me. In all the publications that I have seen, the bird is mentioned as a rare straggler from Europe. In 1885, I met Dr. Coues in New York, and showed him some skins that I had with me, and although he had covered a lot of territory in North America, including Labrador he told me he had never seen the bird alive, and considered it very rare, while he had no data of its nesting in this country. I kept watch for this bird, as I was almost sure of its breeding with us. and later observations proved I was correct. I herewith present all the data, taken from notes made at the time.

1884, May 17. Two seen, both shot to make sure of the species, male and female, shown to Dr. Coues.
1885, May 24. Two seen (not killed).
" Sept. 19. Several seen, likely a brood.

1886, Nov. 9. Three seen.
1889, Sept. 30. Five seen.
" Oct. 17. Several seen.
" Oct. 19. Several seen, possibly same brood.
1891, July 2. Two seen.
" Aug. 7. Several seen, seven or eight.
" Sept. 14. Several seen.
1892, Sept. 14. Five seen.
1894, Sept. 9. Small flock seen, likely one brood.
1898, May 30. Two seen.
" June 4. Two seen, likely same pair.
" Aug. 6. Seven seen, and after that frequently until—
" Nov. 7. Last seen.

After 1898, I had little time to devote to these observations, and was also confined to the house, as the result of an accident to my right leg. But recently I noticed the bird again and shot one, Aug. 14, 1921, out of five seen.

1922, June 6. Pair seen.
" Aug. One brood, of six birds was seen at different times during the month.
" Nov. 4. Last bird seen, single.

It may be noted there are several arrivals of the bird in May and June, and three departures in November. Now what puzzles me is by what route do these birds come and leave. At these dates, Greenland and the adjacent coasts of Baffin Land, Ungava and Labrador are in the grip of winter, and storms, and what could they feed on during such long flights? Are there no records from the Prairie Provinces or Western States? It is not likely that all the birds I have seen here would return to winter in Europe. I think this is a most interesting problem and worth investigating.—Nap. A. Comeau, *Godbout, Quebec.*

Nesting of the Hermit Thrush at West Brookfield, Mass.—Late in the afternoon of June 25, 1922, while driving on a lonely, wooded cross road leading from the historic Foster Hill road, I noticed a bird leave the rocky bank just after I had passed. On investigation, I found a nest on the ground not three feet from the road. It was woven from pine needles and contained four greenish blue elongated eggs.

The bird had flown into a group of hemlocks across the road where it remained silent and invisible.

The pine needle lined nest on the ground and the slightly elongated eggs made me hope that I had found a nesting Hermit Thrush (*Hylocichla guttata pallasi*), although this bird is recorded as a migrant in this locality.

The next day I revisited the spot. The bird left the nest, flew to a pine tree, perched for an instant, then disappeared among the pines. The light was wrong for my glasses and as the bird had flown into an inclosure where deer and buffalo are kept, it was impossible to follow it.

Two of the eggs had hatched. Stealing up to the nest a half hour later, I saw the bird on it; but she flew swiftly into the game preserve as before. A third egg had hatched and half the shell was still inclosing the young bird. I left at once.

At my approach the following day, the bird flew to the stone wall by the wire fence, about eight feet from the nest where it lingered a moment, turning about in its distress, then flew swiftly into the evergreens of the deer park. The light was good so that I was able to see all the distinguishing markings of the Hermit Thrush and the slight lifting of the tail as well.

The egg shells of the third nestling had been removed from the nest. The fourth egg had not hatched.

As I left the next day for my summer camp, I do not know the fate of the young birds; but so far as I have been able to ascertain, this is the first record of the Hermit Thrush's nesting in this part of Worcester County. —CLARA EVERETT REED, *Brookfield, Mass.*

Some Unusual Occurrences in Eastern Vermont.—The following notes are submitted as being of general interest.

Colymbus auritus. HORNED GREBE. On January 23, 1922 after a strong northwest gale a specimen of this species, in healthy condition, was caught on a snow-covered meadow in Woodstock Vermont. It was kept alive for a few days but was finally killed and mounted and is now in the collection of Mr. W. H. Moore of Woodstock.

Larus philadelphia. BONAPARTE'S GULL. An adult male of this species was shot at Taftsville, Vermont, August 2, 1918 and is now in the collection of Mrs. A. B. Morgan of Woodstock.

Puffinus griseus. SOOTY SHEARWATER. Prof. Leland Griggs of Dartmouth College gives me a record of a Sooty Shearwater "captured by some Dartmouth students on the Connecticut River near Hanover, N. H., in the late fall of 1919." The bird was kept alive in a greenhouse for a few days and then liberated. The boundary line between Vermont and New Hampshire is somewhere in the Connecticut River, the courts have not yet decided just where. Therefore possibly this record should be recorded in New Hampshire as well as in Vermont.

Oceanodroma leucorhoa. LEACH'S PETREL. Prof. Leland Griggs gives me also a record of a Leach's Petrel taken at Fairlee Lake, Vermont in the fall of 1902 or 1903. He writes "I killed it myself while it was flying up from the lake." The bird is now in Prof. Griggs' possession.

Phalaropus fulicarius. RED PHALAROPE. An immature specimen of a Red Phalarope was shot at Woodstock, Vermont by W. H. Gillingham, November 10, 1916 and is now in Mr. W. H. Moore's collection.

Coturnicops noveboracensis. YELLOW RAIL. An immature male of this species was captured at Windsor Vermont, October 20, 1913 and is now in the collection of Mrs. A. B. Morgan of Woodstock.

Buteo swainsoni. SWAINSON'S HAWK. An adult male Swainson's Hawk in very dark coloration was taken in Hartland, Vermont, on May 23, 1915, and is now in Mrs. A. B. Morgan's collection.

Corvus corax principalis. NORTHERN RAVEN. An adult male of this species was caught in a steel trap at Hartland, Vermont, November 19, 1912, and is now in the collection of Mrs. A. B. MORGAN.—RICHARD M. MARBLE, *Woodstock, Vermont.*

Further Notes on Lake County, Minnesota, Birds.—On a canoe trip through northern Lake County, Minnesota, from July 26 to September 4, 1922, I followed a route about six to ten miles northward of, but approximately parallel to, the one on which my earlier reports from this region were based ('The Auk,' Vol. XXXVII, No. 4, 1920; and Vol. XXXVIII, No. 1, 1921). The route traversed in 1922 is known as the North Kawishiwi river route and includes in its course the following lakes: lakes One, Two, Three, and Four; and the lakes Hudson, Insula, Alice, Koma, and Polly.

The following species not previously reported by myself, nor by Cahn ('The Auk,' Vol. XXXIX, No. 1, 1922), were added to the Lake County list.

Chlidonias nigra surinamensis. BLACK TERN. Late in the afternoon of Aug. 15, a flock of eleven was seen in a bay on the southwest shore of Lake Alice. The next day a flock of eight was seen along the east shore of the lake; these may have been part of the first mentioned flock.

Archibuteo lagopus sancti-johannis. ROUGH-LEGGED HAWK. Aug. 29, two were seen at the northern extremity of the long northwardly extending arm of Lake Four. This was at the edge of an extensive burned area.

Loxia leucoptera. WHITE-WINGED CROSSBILL. The first White-winged Crossbills were seen by my wife, who accompanied me, July 26, on the long portage of the Kawishiwi. From that locality on, eastward, flocks of five or six and up to a dozen individuals were from time to time identified by their notes at various points along the route, but other troupes identified by the aid of field glasses were recorded for Koma Lake portage, Aug. 10; Lake Three, Aug. 26 and 27; the long Kawishiwi portage again on Sept. 2. Two specimens, a male and a female, were taken Aug. 27, on the south shore of Lake Three, while they were feeding, among several others, in the tops of some tall spruces.

In number of flocks as well as in number of individuals this species was much inferior to the American Crossbill (*Loxia curvirostra minor*) which was found abundant in this district.

Other species which I had not met with in the Isabella river and lake district, south of the present territory, are the Bluebird and the Red-headed Woodpecker, although these have been reported by Cahn (loc. cit.) for the northernmost section of the county. In the large burned area bordering the northern arm of Lake Four I saw many Bluebirds, Aug. 29 and earlier; and on a small wooded island in this portion of the lake two immature Red-headed Woodpeckers were met with, one of which was taken as a specimen. The presence of these two species is doubtless to be at-

tributed to the open conditions produced by the forest fire, which occurred in 1910 and covered an area of many thousand acres.

Through an oversight the following species was omitted from the list of 1920.

Charadrius semipalmatus. SEMIPALMATED PLOVER. A specimen was taken from among several individuals seen on a mud-flat along the Isabella river, about a mile below Rice Lake, in August, 1912. I have not seen the species elsewhere in the region covered.—CHARLES E. JOHNSON, *Department of Zoology, University of Kansas, Lawrence, Kans.*

RECENT LITERATURE

Barbour's 'Birds of Cuba.'—The Nuttal Ornithological Club has just issued another of its beautifully gotten up 'Memoirs.' This, the sixth issue, treats of the birds of the island of Cuba and is by Dr. Thomas Barbour[1] who, as is well known, has made many trips to the island and is thoroughly fitted for the task that he has undertaken. His aim as he explains in the introduction is not only to describe the collections of birds that he has made in the island, but also to provide a work that will be useful to the English speaking visitors and residents who desire to know something of Cuban bird-life and we feel that he has been eminently successful in carrying out his plan.

As we turn the introductory pages we read the same story that is being told in almost every part of the world, of the destruction of forests to permit the constantly increasing cultivation of some commercial crop —sugar cane in the case of Cuba—and the consequent decrease in the native bird-life. Some species are already extinct while others have reached various stages on the same road, the Cuban Ivory-billed Woodpecker being one that has apparently but recently reached the end of the journey.

There is a brief historical sketch of ornithological activity in Cuba, and of the bird collections which exist on the island, of which the Gundlach collection of mounted birds, kept in permanently sealed cabinets, and the modern collection of mounts and skins, belonging to Dr. Charles T. Ramsden, are the most important.

The geography and geology of the island are described in some detail. While Dr. Barbour agrees with geologists that Cuba has never had a land connection with the United States, he does consider that there has been continental connection as evidenced by the more recent discoveries of vertebrate fossils, in Cuba as well as in Haiti and Porto Rico.

[1] Memoirs of the Nuttall Ornithological Club, No. VI. The Birds of Cuba. by Thomas Barbour. With four plates. Cambridge, Massachusetts. Published by the Club. June, 1923, sm. quarto, pp. 1—141

The several physical areas of the island with their characteristic birds are described and there is an account of the climate. To give one a practical idea of the size of Cuba the author states that if superimposed on the United States with one end at St Louis, the other would be at Jacksonville, Florida. while the complicated coast line is about 6800 miles, and the area about 44,000 square miles. Most Americans he finds have no conception of the large size of Cuba.

The main text of the work consists of an annotated list of the 273 species recorded from the island, the North American migrants being very briefly treated while the native species are more fully discussed, with observations on their habits and often a discription of field characters to aid in identification. There is an index but no bibliography, while four excellent photogravure plates illustrate characteristic scenery and the conversion of virgin forest into cane fields.

A hasty analysis of the avifauna shows that exclusive of the water birds and Accipitres there are 70 indiginous species and 73 migrants from North America so that one may fully appreciate Dr. Barbour's statement that during October and April when the migrations are at their height there is to be seen in Cuba the greatest medley of northern and tropical types which can be seen anywhere in the world.

The author acknowledges assistance from Mr. Outram Bangs in matters of nomenclature, he having guided him through "the intricate maze of transitory change" that is "fashionable for the moment," and we thus find many innovations in names as compared with the older lists, although it is gratifying to find that there is a definite stand against the excessive multiplication of genera.

Dr. Barbour has produced an admirable volume which is most welcome, since thirty years have elapsed since the appearance of Gundlach's 'Ornithologia Cubana.'

While Dr. Barbour does not attempt to list all of the collections that have been made in Cuba or the ornithologists that have visited the island, we might add, for the sake of record, that Dr. Wm. L. Abbott made a good collection at Santiago in the eighties which is now in the Philadelphia Academy. The reviewer's pleasure in reading the pages of Dr. Barbour's attractive work has been no little enhanced by the fact that he, like some others mentioned by the author, obtained his first impressions of tropical bird life on a very brief visit to Cuba in 1890, and doubtless very many others who have visited the island in recent years will find a similar enjoyment in perusing this book, while to ornithologists interested in the Antillean fauna it will be indispensible.—W. S.

Horsfield's 'Sidelights on Birds.'—This English bird book,[1] we are told in the "Foreword" is intended "to discuss some of the problems

[1] Sidelights on Birds. An Introduction to the Study of Bird Life. By H. Knight Horsfield. With a foreword by W. Eagle Clarke. Illustrated by Plates after J. Wolf and A. Thorburn and photographs from nature. D. Appleton and Company, New York—MCMXXIII, pp. 1–224, 19 illustrations, one in colors. $4.00

which have arisen as the result of our latter-day knowledge, especially on the philosophic rather than the technical side of ornithology. It undoubtedly contains in concise form much information which the general reader would not come across in the bird books to which he has access, while the author presents his subject in an attractive and interesting manner, with many a note and comment which indicate a life devoted to nature and in sympathy with the creatures of which he writes.

In part one we have the following chapter headings which will give one an idea of the scope of the book,—Structure of Birds; Nests; Eggs; Movement in Birds; Altitude and Speed of Flight; Migration; Occult Senses; Property in Bird-life; Language of Birds; Marriage; Childhood; the Bird and the Tree; The Artist and the Birds; Birds of the Poets; Birds of the Bible; Fabulous Birds. Part two consists of 'Some Celebrated Haunts' which the author has visited—Shetland, The Hebrides, Norway, Switzerland and Canada.

While the volume lives up to its object in presenting the conclusions reached in some of the more recent English bird books, it does not indicate any close familiarity with the recent literature of the ornithological journals; while the great mass of American ornithological literature is almost totally ignored. No mention is made of Dr. Watson's famous experiments which throw so much light on the subject of bird migration; nor of bird banding and its bearing on the subject, nor of the late Professor Cooke's numerous publications. Nor is there anything on the coloration of birds, a problem upon which there has been endless philosophic discussion of late years. While Mr. Horsfield and his publishers have prepared an attractive little volume which will interest the lay reader, it will not entirely meet the needs of the average American bird student who desires a full resumé of more recent ornithiological knowledge.—W. S.

Witherby's 'Handbook of British Birds.'—Part XVI of this excellent work covers the remainder of the shore-birds and the terns and carries two plates of the downy young, that of the shore birds being in colors.

Two races of the Redshank are admitted, the Greenland bird being *Tringa totanus robusta* (Schiöler). The genus *Capella* Frenzel is used in place of *Gallinago* having "unfortunate" priority and thus another familiar name sinks into synonymy. Similarly *Chlidonias* replaces *Hydrochelidon*.

The Caspian Tern is separated generically (*Hydroprogne*) but the Sandwich Tern is retained in *Sterna* and in the shore-birds not only are the "Solitary Sandpipers" and Yellow-legs all included in *Tringa* but also the representative of the Wandering Tattler, illustrating how difficult it is to effect any uniformity in generic subdivision, so long as the matter is left to personal opinion.

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[1] A Practical Handbook of British Birds. Edited by H. F. Witherby. Part XVI, March 7, 1923, (Part XII, October 5, 1921). 4s 6d per part.

Part XII of this work, which was not received at the time of issue and hence not noticed in these columns, is entirely devoted to ducks with an excellent colored plate of the wings of the surface feeding species. Of these the Mallard, Teal, Widgeon and Pintail are included in *Anas* and the Pochard, Scaup, Ringneck etc., which one or two recent authors have so hopelessly separated, are kept together in *Nyroca*.—W. S.

Lönnberg on Palaearctic Goshawks.— In this paper[1] the author comments on the great variability of these birds and the difficulty of determining what differences are due to age and season and what to geographic variation. He confirms Schiöler in finding a difference between the Goshawks of middle Europe and the Scandinavian peninsula but shows that the name for the former should be *dubius* not *gallinarum*. A new race *Astur gentilis poecilopterus* (p. 215) is described from northern Russia and a specimen from Kansu, China, identified with *A. g. khamensis* Buturlin.—W. S.

Todd on the Genus Arremonops. Mr. Todd as a result of a careful study of a large series[2] of specimens recognizes seven species of this genus. *A. conirostris* (3 subspecies), *striaticeps* (4 subspecies), *chloronotus tocuyensis*, *verticalis*, *superciliosus* (3 subspecies) and *rufivirgatus*, (2 subspecies). *A. conirostris umbrinus* (p. 38) Merida, Venezuela, is described as new.—W. S.

Reports of the Roosevelt Wild Life Station.—The March Bulletin[3] of the Roosevelt Wild Life Forest Experiment Station contains two major papers. 'The Summer Birds of the Alleghany State Park' by Aretas A. Saunders and 'The Ruffed Grouse with Special Reference to its Drumming' by Edmund J. Sawyer.

The former is an admirable account of the breeding birds of the Park, arranged in strictly ecological groups; birds of the orchards and shade trees; the open fields; the upland thickets; the forest floor and undergrowth; the upper branches and forest crown; the marshes, the water margins and lowland thickets. There are plates in colors of four of these groups from paintings by E. J. Sawyer and numerous half-tones of characteristic habitats, which unfortunately do not do justice to the photographs from which they are taken on account of being printed on ordinary text paper.

There is a chapter on field identification and a key based on field characters, while the author has much to say on songs and call notes, a subject to which he has given much thought and study. His attempts at syllabic representation of songs are the best we have seen and he wisely refrains

[1] Some Remarks on Palaearctic Goshawks. By Einar Lönnberg, Ibis, April, 1923, pp. 211–217.

[2] A Synopsis of the Genus Arremonops. By W. E. Clyde Todd. Proc. Biol. Soc. Wash., Vol. 35., pp. 35–44, March 28, 1923.

[3] Roosevelt Wild Life Bulletin, Vol. I, No. 3, March, 1923. Published Quarterly by the University, Syracuse, N. Y., pp. 229–386, pls. 25–29, figs. 71–122. Map 4

from using English words, preferring to form arbitrary syllables which represent the bird notes as they sound to him.

The usual data of time of occurrence, relative abundance etc., are given, but the keynote of the whole paper is field identification; a subject to which we cannot give too much attention in these days, when sight records are becoming our main stock in trade in many ornithological investigations. Mr. Sawyer's paper on the drumming of the Grouse, illustrated by 28 snapshots of drumming birds, is a monograph on the subject. The author has watched, at a distance of a dozen feet, at least a hundred drummings and upon the data thus secured are his conclusions based, although he also discusses the more important publications on the subject.

The main new facts that he feels that he has proven—although one of them he states has previously been assumed—are that (1) the outward and upward motion of the wings is chiefly responsible for the drumming sound, not the forward and downward stroke, the latter being practically silent; (2) the striking of the air with the wings is practically the sole cause of the sound; (3) the fluttering at the end of the drumming is devoid of the ventriloquism which marks the preceeding part of the performance; (4) frequently the bird turns completely around before drumming but faces the same way each time on a given log. The details of his observations are replete with interest and should be carefully read by all who are interested in this noble game bird. The bulletin as a whole is one of the best yet issued by the Station.

In this connection, attention should be called to a paper[1] on the 'Relation of Wild Life to the Public in National and State Parks' by Dr. Chas. C. Adams, director of the Station. This should be carefully read by everyone interested in wild life preservation. The pleas against *extermination* of any species and against the introduction of exotic species of animals or plants into wild life preserves are points well taken and should have the widest publicity. Our National and State parks and reservations are our only hope for the preservation of any part of the primaeval wilderness and all commercialism or destruction of Nature's balance within these areas must be prevented. Certain species may be "pests" or "vermin" on the farmer's acres and may have to be killed there to allow some other species of commercial value to increase abnormally, but in the wilderness where the aim is to preserve primaeval conditions all species are on the same footing and nature who has always taken care of their interrelation can be trusted to govern them without man's interference.—W. S.

Recent Papers by Bangs and Penard.—Messrs. Outram Bangs and Thomas E. Penard have recently described a new Bee-eater[2] *Merops*

[1] The Relation of Wild Life to the Public in National and State Parks. By Dr. Charles C. Adams. Proc. Second Nat. Conference State Parks, 1922. pp. 129–147, 1923.

[2] A New Merops from Java, Proc. N. E. Zool. Club, VIII, p. 43, Feb. 27, 1923.

sumatranus coeligenus (p. 43) from Java and a Bulbul,[1] *Haringtonia leucocephalus montivagus* (pp. 41) from Fukien, China.

Mr. Penard has also described *Leptotila verreauxi tenella* (p. 35), *Milvago chimachima paludivaga*[2] (p. 36) and *Empidonax lawrencei nemoralis*[3] (p. 63) from Surinam.—W. S.

Griscom on New Birds.—Mr. Ludlow Griscom[4] has described the following new forms from the collections of Dr. L. C. Sanford and the American Museum of Natural History: *Dendragapus obscurus munroi* (p. 1) Queen Charlotte Isls., B. C.; *Vermivora browni* (p. 4) a remarkable unique specimen from Miquihuana, Tamaulipas, Mexico, related to *V. crissalis* (Salv. and Godm), also known from a single specimen; *Dendroica pinus chrysoleuca* (p. 5) Santo Domingo, and *Coereba oblita* (p. 7) St. Andrews Island, W. I.

Townsend on Birds collected in Lower California.—This is a belated report[5] on the birds collected on the voyage of the 'Albatross' in Lower California waters in 1911. Collecting parties went ashore at thirty different points on the peninsula and outlying islands and secured 804 specimens, representing 159 species and subspecies. Drs. Chas. H. Townsend and Paul Bartsch and Messrs. H. E. Anthony and P. I. Osburn collected the specimens, the majority being obtained by the last two.

Data for specimens and some brief annotations accompany the list and *Pipilo fuscus jamesi* (p. 20) is described as new from Tiburon Island. A colored plate of this bird, a map, and several half-tones comprise the illustrations.—W. S.

Mailliard on Field Work in Northern California in 1921.—Mr. Mailliard presents an account[6] of field work in Del Norte County during the season of 1921, by himself and Mr. Chase Littlejohn in the interest of the California Academy. The aspects of the country and the daily experiences of the expedition are described and an annotated list of 71 species is presented.—W. S.

New Argentine Birds.—Dr. Alexander Wetmore and Mr. James L. Peters[7] propose the genus *Nycticryphes* (p. 143) for *Rhynchaea* which

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[1] A New Bulbul from Fukien, China, Ibid, p. 41–42.

[2] Two New Forms of Surinam Birds, Ibid pp. 35–36, Feb. 6, 1923.

[3] A New Flycatcher from Surinam, Proc. Biol. Soc. Wash. 36, pp. 63–64, March 28, 1923.

[4] Descriptions of Apparently New Birds from North America and the West Indies. By Ludlow Griscom.Amer. Mus. Novitates, No. 71. April 30, 1923, pp. 1–8.

[5] Birds Collected in Lower California. By Charles Haskins Townsend. Bull. Amer. Mus. Nat. Hist., XLVIII, pp. 1–26, March 9, 1923.

[6] Field Work among the Birds and Mammals of the Northern Coast of California in 1921. By Joseph Mailliard. Proc. Calif. Acad. Sci., XII, No. 1, pp. 1–26, January 2, 1923.

[7] New Genera and Subspecies based on Argentine Birds. By Alexander Wetmore and James L. Peters. Proc. Biol. Soc. Wash., Vol. 36, pp. 143–146. May 1, 1923.

proves to be a synonym of *Rostratula*, and *Entotriccus* (p. 144) for *Muscisaxicola striaticeps*. Two new subspecies are also described *Stigmatura budytoides inzonata* (p. 143), Tucuman and *Mimus patagonicus tricosus* (p. 145), Mendoza.

Mr. Peters also describes[1] *Pteroptochos rubecula hylonympha* (p. 45).—W. S.

Wetmore on Migration Records from Birds Banded at Salt Lake, Utah.—This record[2] is mainly of ducks banded by Dr. Wetmore during 1914–1916 while investigating duck mortality on Great Salt Lake. In all 1241 birds were banded of which 185 were later killed and reported. Most of these return records were from Utah, usually not far from the place of release, but others were from California, Idaho, Arizona, Texas, etc. The many California returns of Green-winged Teals indicate that the birds of this species which nest in Utah winter in southern California.

Four Snowy Herons were recovered on the west coast of Mexico, while a Great Blue Heron was taken in Montana indicating a northward migration after the nesting season in this species, a habit well known in Herons of the Atlantic Coast.—W. S.

Chapin on African Birds.—In working up his Congo collections Mr. Chapin has recently[3] considered the subspecies of the Narina Trogon of which he recognizes four, *Apaloderma narina brachyurum* (p. 4) from the Ituri District being described as new.

Of the Swallows of the genus *Psalidroprocne* he finds one undescribed species, *P. mangbettorum* (p. 7), from the same region, and also an undescribed race of *Pyrenestes*, *P. ostrinus maximus* (p. 8), from the Upper Uelle District, the largest of the group.

In another paper[4] Mr. Chapin discusses the ecological aspects of bird distribution in tropical Africa. He presents much interesting data, for the student of zoogeography and concludes that while temperature may be a distributional factor of weight, it acts mainly along certain critical lines, as that bounding the region where occasional frosts occur, but within the limits of the Tropical Zone humidity becomes the predominating factor. Its influence on bird distribution is through the effect of humidity on plant life, the avifaunal lines of demarcation being never more sharply defined than the changes in vegetation.

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[1] A New Babbler from Argentina. By James Lee Peters. Proc. N. E. Zool. Club, VIII, pp. 45–46, March 21, 1923.

[2] Migration Records from Wild Ducks and Other Birds Banded in the Salt Lake Valley, Utah. By Alexander Wetmore. U. S. Dept. Agr. Bull. 1145, May 10, 1923, pp. 1–14.

[3] Notes on Some Birds of Tropical Africa with Descriptions of three New Forms. By James P. Chapin. Amer. Mus. Novitates No. 56. February 9, 1923, pp. 1–125.

[4] Ecological Aspects of Bird Distribution in Tropical Africa. By James P. Chapin. Amer. Naturalist, LVII, March–April, 1923, pp. 106–125.

A third paper[1] by Mr. Chapin describes a new Crested Guinea Fowl, *Guttera edouardi schoutedeni* (p. 3) from the Belgian Congo.—W. S.

Chapman on the Distribution of the Motmots.—The first portion of this paper[2] consists of a careful systematic review of the genus *Momotus* with maps illustrating the distribution of the species and the description of a new form, *Momotus momota simplex* (p. 44) Santarem, Brazil. The concluding portion considers the origin and spread of the family Momotidae and throws interesting light on the geographical origin of South American bird-life.

Briefly summarized Dr. Chapman's conclusions are that the family originated in Central America, *Hylomanes* and *Aspatha*—the latter related to the Todidae—being the most primitive genera. *Momotus*, with its many intergrading forms and wide range is the most recently evolved group. He considers that there were three invasions of the family into South America. First, in pre-Andean time, came *Baryphthengus* which reached southeastern Brazil where it became isolated. Then, twice came incursions of the genus *Momotus*, first along the subtropical zone which then extended unbroken across Panama to the Andes and southward to Peru; and second, after the Panama subsidence, an influx into northern Colombia and Venezuela, north of the Andes, to Trinidad and Tobago which were then connected with the mainland.

Dr. Chapin has presented a most interesting study in zoogeography and his conclusions seem to be well supported by his evidence.

In a later paper[3] Dr. Chapman describes thirteen new birds from Panama, Venezuela, Ecuador, Peru and Bolivia.—W. S.

Cockerell on the Plumage of Diatryma.[4]—In the Green River Eocene, on Roan Creek, western Colorado, well known for its deposits of fossil insects and plants, Mrs. T. D. A. Cockerell has discovered some long strands identified by Dr. Cockerell as bird plumage similar to that of the Cassowary. These he considers must have belonged to *Diatryma* and they are named *Diatryma* (?) *filifera* (p. 4), as the horizon is higher than any known for that genus and therefore the probability is that they do not belong to any of the described species. After his preliminary reference to *Archaeapteryx* and the impossibility of identifying the type feather with either of the skeletons which have been referred to the genus, we wonder what is to be gained by giving these interesting filaments a technical name and referring them to a genus known only from the skeleton.—W. S.

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[1] The Crested Guinea Fowl of the Southern Congo Basin. By James P. Chapin. Rev. Zool. Africaine, XI, fasc. 1, 1923.

[2] The Distribution of the Motmots of the Genus Momotus. By Frank M. Chapman. Bull. Amer. Mus. Nat. Hist., XLVIII, pp. 27–59. March 15, 1923.

[3] Descriptions of Proposed New Birds from Panama, Venezuela, Ecuador, Peru and Bolivia. Amer. Mus. Novitates, No. 67. April 11, 1923. pp. 1–12.

[4] The Supposed Plumage of the Eocene Bird *Diatryma*. By T. D. A. Cockerell. Amer. Mus. Novitates, No. 62, March 16, 1923, pp. 1–4.

Stoner on Bird Banding and Incidental Studies.[1]—The author calls attention to the fact that in hunting for young birds to band one discovers many things that might escape notice without some definite object in view, and his incidental observations, as in some other similar papers, have really nothing to do with bird banding.

There are notes on nests and young of Black-billed Cuckoo, Kingfisher, Whip-poor-will, etc. Counts of the calls of the Whip-poor-will showed 294, 396 and 446 repetitions with three to five brief intervals. The author also comments on the high mortality of young birds even in localities far removed from man's influence.—W. S.

Hartert et al on the Birds of Northern Africa.—Several important papers[2] appeared in Volume XXX of 'Novitates Zoologicae' on the birds of northern Africa. Lord Rothschild and Dr. Hartert have an interesting account of their journey to Algeria in the autumn of 1920 with an annotated list of 58 species.

Dr. Hartert has also an account[3] of his trip to Cyrenaica in the spring of 1922, with a list of 115 species, including those reported by previous visitors to this neglected provence, about the bird life of which almost nothing was known until Dr. Festa's visit in 1921.

Dr. Hartert with the assistance of Mr. Jourdain has prepared a list[4] of the birds known to inhabit Marocco based on the collections and records of previous explorers. The list comprises 340 species and subspecies of which *Phalacrocorax graculus riggenbachi* (p. 132) is described as new, from Cape Blanco. A full bibliography completes this valuable paper.—W. S.

Rothschild on Birds from Yunnan.—Lord Rothschild presents an annotated list[5] of a second collection received from Mr. George Forrest, which comprised 195 species and was particularly rich in Pheasants and large Woodpeckers.—W. S.

Mathews' 'The Birds of Australia.'—Two parts of this work[6] are before us the first of which completes the Sylviidae, treating several species of Grass-wrens (*Magnamytis*), and covers most of the *Artamidae* or Wood Swallows. The latter part completes this family and covers the genera

[1] Bird Banding and Incidental Studies. By Dayton Stoner. Iowa Acad. Sci. vol. XXVIII, 1921. pp. 151–159.

[2] An Ornithological Autumn Journey to Algeria. By Lord Rothschild and Ernest Hartert. Novitates Zoologicae, XXX, pp. 79–88. March, 1923.

[3] On the Birds of Cyrenaica. By Ernst Hartert. Ibid, pp. 1–32.

[4] The Hitherto Known Birds of Marocco. By Ernest Hartert assisted by F. C. R. Jourdain. Ibid, pp. 91–152.

[5] On a Second Collection sent by Mr. George Forrest from N.W. Yunnan. By Lord Rothschild. Novitates Zoologicae, XXX, pp. 33–58, March, 1923.

[6] The Birds of Australia. By Gregory M. Mathews. Vol. X, Part 4. March 19, 1923, and Part 5. April 24, 1923. H. F. and G. Witherby, 326 High Holborn, London, W.C.

Colluricincla and *Grallina* for which the author retains Sharpe's family *Prionopidae* because it was impossible to include them in the place to which he would refer them next *Pachycephala*, and *Piezorhynchus* respectively. In this part also begins the treatment of the Australian Magpies (*Gymnorhina*) better known in our Zoological Gardens as Piping Crows. The following appear to be new names (in Part 4) *Magnamytis alligator* (p. 212) Alligator River, N. Territory, and *Austrartamus melanops normani* (p. 255) Normanton; (in Part 5) *Colluricincla harmonica kingi* (p. 289). King Isl.—W. S.

Economic Ornithology in Recent Entomological Publications.—Bird enemies of certain insects have been considered in recent publications devoted to entomology and the points made are briefly summarized and commented upon below.

Corn earworm (*Heliothis obsoleta*).—"The most destructive insect enemy of corn in the United States is the corn earworm" and its ravages cause a loss to growers of $40,000,000 or more annually. Preying upon this pest is therefore especially creditable to birds. Records of the Biological Survey quoted in a bulletin[1] prepared by the federal Bureau of Entomology show that "17 species of birds feed on the corn earworm and that the most important of these seem to be the Brewer's and California Red-winged Blackbirds, the Boat-tailed Grackle, and the Downy Woodpecker. As many as 10 larvae of the earworm have been found in a single stomach of the Cardinal and more than 50 in one of the Boat-tailed Grackle."

The clover-leaf weevil (*Hypera punctata*).—This is a European insect that has thrived and spread in the United States and which regularly takes an important toll from our clover crops. Our birds have shown their customary lack of prejudice in the matter of food items by feeding freely upon this immigrant. Quotation by authors' of a recent bulletin on the pest of results published by the Biological Survey in 1916 serve to emphasize the fact that knowledge of the enemies of practically every insect constantly increases. In 1916 we knew of 25 species of birds which preyed upon clover-leaf weevils, now the list has grown to 43. The most important of these avian enemies is the Starling, in 1125 stomachs of which these weevils have been identified; 206 stomachs of Crows, and 100 of Crow Black-birds also yielded this insect. Largest numbers of adult weevils were recovered from stomachs of the Starling (26), Nighthawk (24) and Crow (20); and of larvae from stomachs of the Starling (49) and Vesper Sparrow (31).

European corn borer (*Pyrausta nubilalis*).—Another unwelcome immigrant from the old-world, the corn borer, threatens to become a pest of the first magnitude. The insect is now established in localities scattered

[1] Farmers' Bul. 1310, by W. J. Phillips and Kenneth M. King, Jan., 1923, p. 12.
[2] Herrick, G. W. and Hadley, C. H., Jr., Bul. 411, Cornell Agr. Exp. Sta., July, 1922, p. 10.

from eastern Massachusetts to Ontario and Michigan and is doing tremendous damage to corn in addition to attacking numerous other cultivated plants. The larvae of the pest are concealed within the host plant during most of their existence and consequently are screened from the attacks of birds. However, the list of American birds known to feed upon the borer in the United States is steadily growing and now includes the introduced Pheasant, Woodpecker, Starling, Blackbirds, and the Robin.[1]

A study[2] of the insect and its enemies in Ontario has yielded additions to this list of bird enemies besides interesting information about their activities. "In Ontario," the authors say: "so far, only a few natural enemies have been found to prey upon the European Corn Borer. Of birds, the Downy and Hairy Woodpeckers have frequently been seen digging the borers out of the stalks and stubbles in the field. In one field these birds were computed to have taken 60% of the borers during the winter months of 1921. Robins were observed eating borers which had come to the surface after a heavily infested field had been plowed down. They were also seen taking them from cages in experiments. Blackbirds were noticed in great flocks in the fall in a badly infested field of sweet corn, but it was not determined whether they were eating borers or not, though there seemed little doubt that they were. Other birds, such as Kingbirds, Phoebes and Wrens were observed catching the moths in the morning when these were emerging. Doubtless there are several other birds, such as Crows, which feed to some extent upon the insect."

Sugar-cane betles in Queensland.—A number of species of the family Scarabaeidae attack sugar-cane in Queensland where it has been estimated they do about £ 100,000 damage annually. The natural enemies of these pests are treated in some recent bulletins[3] of the Bureau of Sugar Experiment Stations, and in every case highest rank in efficiency is given to birds. The Ibises (*Carphibis spinicollis*, and *Ibis molucca*) are said to be of tremendous importance wherever they occur. They are assiduous in following the plow and have been observed to clear fields of the grubs when so doing. They also probe the ground at the base of stools of cane and remove the grubs. In the opinion of some authorities the Crow (*Corvus australis*) should be given first place as a grub-destroyer. Like its American relatives, however, the Australian crow has certain injurious habits which cause farmers to discourage its presence. A Hawk (*Hieracidea berigora*), the Laughing Jackass (*Dacelo leachii*), the Pewee Lark (*Grallina picata*) and the Indian Myna (*Acridotheres tristis*) also are given special mention as enemies of the cane-beetles.

Tussock moth (*Hemerocampa leucostigma*).—Mr. Alan G. Dunstan summarizes[4] an interesting study of the natural control of this insect

[1] Caffrey, D. J. and Worthley, L. H., Farmers' Bul. 1294, January, 1923, p. 27.
[2] Spencer, G. J. and Crawford, H. G., Bul. 295, Ont. Dept. Agr., March, 1923. p. 7.
[3] Div. Ent. Bul. No. 13, 47 pp. 8 Pls., 1921, Bul. No. 16, pp. 77–81, 1921.
[4] Proc. Acadian Ent. Soc., 1922, p. 109.

pest as follows: "Investigations carried over a period of two years have shown that in cities the insect is controlled chiefly by three factors: non-hatch of eggs, starvation of the larvae hatching from eggs laid on buildings, and insect parasites. In the forest, however, a totally different condition exists, and there we find that birds and ants are responsible for holding the insect at par and preventing it from reaching a state of outbreak."

Although this writer did not observe birds preying upon the tussock moth in cities, the reviewer has observed robins feeding freely upon the larvae in Washington, D. C.. Mr. Dunstan reports that in the forest "practically every egg-mass laid above the snow-line (and over ninety per cent of them are) had been either partially or wholly destroyed by birds." (p. 119.) Observation of the kinds of forest birds feeding on larvae proved impossible, but by exposing larvae where they would be accessible to birds and apparently to no other enemies it was found that the supplies regularly disappeared, sometimes at the rate of 25 to 30 caterpillars a day. Birds are credited with destroying half of the larvae hatching in forests.

In the United States twelve species of birds are now known to feed upon one stage or another of the tussock moth, and the list does not include a single species of the groups (such as Paridae) that must be concerned in the extensive destruction of the eggs of the insect pointed out by Mr. Dunstan.

Lace-wing flies (*Chrysopidae*).—In an exhaustive paper on The Biology of the Chrysopidae,[1] a very fair attitude in general is taken relative to the value of protective adaptations of these insects. Of the adults it is said that the color "so closely simulates their environment that considerable protection is afforded. But more striking is the repellent odor of most species. This odor is sickening and very objectionable . . . but . . . is only a partial protection from the insects' enemies, though predacious enemies have been observed to be less serious than parasitic ones." It is interesting to note that stomach examinaton by the Biological Survey so far has revealed 17 species of birds as predators upon Chrysopidae, most of them taking adults, but 5 having eaten larvae. The nighthawk led in the attack on lace-wings, ten birds having taken these flies, in numbers up to 10 and 12 to a meal. The fact that such groups of birds as the Caprimulgidae and Hirundinidae have been developed as practically indiscriminate feeders on flying insects would indicate that these insects have few or no qualities really noxious to the birds.—W. L. M.

Success in Prairie Tree Planting.—In an interesting bulletin[2] with the foregoing title, relating to trees for the prairies of Manitoba, Saskatchewan, and Alberta, it is clearly brought out that a valued part of the success with trees is the attraction of birds. "The birds build in them and flocks

[1] Smith, Roger C. Mem. 58, Cornell Agr. Exp. Sta. (June, 1922) 1923, p. 1330

[2] No. 72, Forestry Branch, Can. Dept. Interior, by Norman M. Ross, 34 pp., 1922.

of birds come to them that we never saw before the trees were there," writes one settler. Others mention the same point and two farmers note that the trees are a protection to poultry against hawks.—W. L. M.

Another Insect Birds Should not Eat.—Proponents of theoretical biology probably never will cease to put on record *suppositions* as to remarkable protective adaptions, but with this premise it should follow that those in possession of pertinent *facts* ought to be at least equally persistent in exploiting them. The instance in mind at the present time concerns the red-humped apple caterpilar (*Schizura concinna*), a black and yellow striped larva with red head and hump, which is highly gregarious, and can spray a liquid containing formic acid—in a word, a form that has about all the attributes of an "especially protected" species. Concerning it the statement has recently been made that "it is not likely that a sparrow or any other small predaceous enemy would repeat an attack on the caterpillar after receiving a quantity of highly irritating secretion in its eyes or mouth."[1] Sparrows usually are not especially important enemies of large caterpillars, but if a protective function of the red-hump's secretion against birds in general is implied by the remark quoted, we must say it is not supported by the facts. The Robin, Olive-backed Thrush, both species of Cuckoos, Ruffed Grouse, and Broad-winged Hawk are known to feed on this caterpillar. As to risking a second experience with the red-hump's spray it must be said that no fewer than 11 of these larvae have been found in a single stomach of the Broad-winged Hawk, 12 in that of a Black-billed, and 25 in that of a Yellow-billed Cuckoo. As the red-hump is a noteworthy pest of apple-trees all of the birds mentioned deserve credit in an economic sense also for feeding on the insect.—W. L. M.

The Ornithological Journals.

Bird-Lore. XXV, No. 2. March–April, 1923.

Two Nest-Studies of McCown's Longspur. By A. D. DuBois—Illustrated by admirable photographs.

The Nest on the Rain-Pipe. By P. C. Samson.—Detailed study of a Robin's nest.

Some Robins and their Nests. By Edw. R. Warren.

Love of Home is Characteristic of Robins. By E. H. Eves.

Ducky, an Orphan Robin. By Jessie Ferguson.

A Story of an Albino Robin. By F. M. Tuttle.

Cardinal Friendships.—Two accounts of attachment of captive Cardinals for their owners.

The migration table treats of the Orchard Oriole with a plate by Fuertes.

April in the Marshes, by A. A. Allen, in the School Department, is an admirable article with beautiful illustrations.

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[1] Detwiler, J. D., Can. Ent. 54, No. 8, Aug., 1922, p. 187.

The Condor. XXV, No. 2. March–April, 1923.

The Fulvous Tree-Ducks of Buena Vista Lake. By D. R. Dickey and A. J. Van Rossem.

William W. Price. By Walter K. Fisher.—An appreciative sketch of this well known California field naturalist who died November 9, 1922.

Black Wing-tips. By C. K. Averill.—The author argues that black feathers are less subject to wear than white and the exposed outer webs and tips are for that reason often black.

Random Notes on Alaska Snow Buntings. By G. Dallas Hanna.

The Wilson Bulletin. XXXV, No. 1. March, 1923.

Frontispiece photograph of the A. O. U. at Chicago.

Conditions of the Breeding Game Birds in North Dakota; Expedition of the Chicago Academy of Sciences. By F. M. Woodruff.—Numerous photographs.

Summer Birds of the Les Cheneaux Islands. By J. Van Tyne.

Notes from the Tennessee Cumberlands. By A. F. Ganier.

Random Notes from Arkansas. By H. E. Wheeler.

Some Michigan Bird Records. By Walter Koeltz.

Nesting of the Sharp-shinned Hawk. By A. F. Ganier.—Near Nashville, Tenn., a furtherest south record.

The Oölogist. XL, No. 4. April, 1923.

Nesting of the Solitary Sandpiper. By A. D. Henderson.—In an old Robin's nest, apparently in Alberta though no locality is given.

Wheatland, Wyo., Birds. By J. A. Neilson.—An annotated list.

Bulletin Essex Co., [Mass.] Ornithological Club. 1922.

The Music of the Golden-eye. By Charles W. Townsend.

The So-called Suicide of Wounded Water Birds. By E. H. Forbush.

Game and Shore Birds in Essex County, Mass., 1922. By John C. Phillips.

The Ipswich River Bird Trip. By Ralph Lawson.

The Bay-breasted Warbler on Mt. Monadnock, New Hampshire, in Summer. By Charles L. Whittle.

Concerning the Field Identification of the Barrow's Golden-eye. By Arthur P. Stubbs.

An Annotated List of Birds Observed by the Members of the Essex County Ornithological Club. 1922.

The First Year of the New England Bird Banding Association. By Lawrence B. Fletcher.

There are several local notes including an alleged occurrence of the Western Grebe at Ipswich Beach. The observer's notes made at the time were "Loon? *White* neck and sides, light bill," and although over two pages are devoted to an identification of this bird with Chapman's two line description of the Western Grebe we agree with the writer that "others will be reluctant to consider such an identification as constituting

a primal record." In these days when we are trying to minimize the collecting of specimens by making our sight records as accurate as possible and publishing only those based on most convincing and adequate observations it is hard to find warrant for such a publication.

The Ibis. (11 series) V, No. 2. April, 1923.

The Fossil Eggs of Bermudan Birds. By Casey A. Wood.

Recent Notes on the Arabian Ostrich. By R. E. Cheesman.

Some Remarks on Palaearctic Goshawks. By Einar Lönnberg. (see antea p. 551).

Supplementary Notes on Some Birds from Western Australia and from Dirk Hartog Island. By Thomas Carter.

A Comparison between Mr. E. C. Stuart Baker's Revision of the Genus *Gennaeus* and that of Mr. W. Beebe in his 'Monograph of the Pheasants.' By Rose H. Thomas.

A Note on the Classification of Certain Indian Birds. By B. B. Osmaston.

The Birds of Sind. By C. B. Ticehurst.

Notes on the Systematic Position of *Ortyxelus*, together with Some Remarks on the Relationships of the Turnicomorphs and the Position of the Seed-Snipe (Thinocoridae) and Sand Grouse. By Percy R. Lowe.—*Ortyxelus* proves to be related to the Turnicidae rather than to the Cursoriidae, while the former group seems to be associated with the Sand Grouse and Pigeons though more ancient and generalized than either. The curious Seed-Snipe of the Andes he considers must be paced at the base of the Charadriiformes as the Turnicidae are at the base of the Columbiformes or that they, along with the Turnicidae and Pteroclididae, are to be regarded as surviving offshoots of an ancient group, now extinct, from which sprang the now dominant, Pigeons, Plovers and Fowls. There is a detailed consideration of the pterylography, osteology, etc. of *Ortyxelus*, in this most important paper.

On the Birds of Southeast Yunnan, S. W. China. By J. D. La Touche.

Bulletin of the British Ornithologists' Club. CCLXXV. January 29, 1923.

D. Bannerman describes *Hirundo senegalensis saturatior* (p. 85) Gold Coast.

N. Kuroda proposes seven new races of Japanese Birds.

Bulletin of the British Ornithologists' Club. CCLXXVI. March 5, 1923.

H. Lynes describes five new races of birds from Darfur and exhibited the recently discovered eggs of *Ortyxelus muffreni* which were distinctly Turniciform in character (cf. Lowe above). He also cancelled his recently described *Amadina fasciata furensis* which proves to be the first plumage of A. *fasciata*, and *Prionops concinnata ochracea*, the characters of which are not constant.

J. D. La Touche describes five new Chinese birds and N. Kuroda eight from Japan.

Percy R. Lowe proposes *Paradisea apoda luptoni* (p. 110) for a skin of unknown locality, intermediate in color between *raggiana* and *novaeguineae*.

Bulletin of the British Ornithologists' Club. CCLXXVII. March 29, 1923.

Lord Rothschild calls attention to the fact that the intermediate Bird of Paradise recently named by Dr. Lowe had long been known and was clearly a hybrid between the two forms mentioned by the describer. These hybrids occurred in large numbers and seemed to differ in character from ordinary isolated hybrids and he proposed for such forms the term "racial hybrid" as suggested by Dr. Lowe.

Lord Rothschild and Dr. Hartert propose *Madanga* (p. 117) *ruficollis* (p. 118) for a new bird from Buru allied to *Zosterops*.

Dr. Hartert also describes *Argya aylmeri loveridgei* (p. 118) Mt. Kenya, Africa; Robinson and Kloss, *Pericrocotus brevirostris annamensis* (p. 119) Dalat, Annam; J. D. La Touche, *Passer rutilans yunnanensis* (p. 120); S. E. Yunnan and N. Kuroda five additional Japanese birds.

British Birds. XVI, No. 10. March 1, 1923.

Migrations of Some British Ducks; Results of the Marking Method. By A. Landsborough Thomson.—Records covering 17 years and which therefore are sufficiently extensive to furnish important results. One of these is that some Mallards and other species hatched in Great Britain are found next year in a totally different area, presumably accompanying winter residents to a farther north breeding ground.

The 'British Birds' marking scheme. 1922. By H. F. Witherby.

British Birds. XVI, No. 11. April 2, 1923.

Recent observations on some Irish Breeding Birds. By C. V. Stoney.

British Birds. XVI, No. 12. May 1, 1923.

Field Notes on the Nesting of Divers. By N. Gilroy.

On the Specific Name of the Common Guillemot. By F. C. R. Jourdain. —Demonstrates clearly that *Uria troille* (L.) is based on a Brunnich's Guillemot and therefore the name becomes a synonym of *U. lomvia* and *U. aalge* Pontop. becomes the name of the Common Guillemot.

In a paper immediately following H. F. Witherby shows that true *U. aalge* is the breeding bird from N. E. America, Iceland, and Scandinavia but that the bird of the British Isles is distinct and he names it *U. a. albionis*. (p. 324).

The Avicultural Magazine. (4th series). Vol. 1. Nos. 1 to 4, January to April, 1923.

With heavier paper and numerous plates the fourth series of this journal makes a fine showing. No. 1 contains the first part of a work on Aviculture to appear simultaneously in this journal and 'L'Oiseau.' This

part covers housing. There is a colored plate of finches and weavers and one of *Thalurania furcata*. No. 2 has a paper on Birds of Paradise and Bower Birds by D. Seth. Smith with a plate showing several species in display. No. 3contains 'The Crow Tribe' by G. B. Meade-Waldo and No. 4 'The Drangos, Starlings, Grackles and Troupials' by J. De la Cour with a plate of several species and another of Paradise Birds.

The Emu. XXII, Part 4, April, 1923.

Tree-creepers of the genus Climacteris. By A. J. Campbell.

Notes on the Pied-bill Magpie, (*Sterpera graculina*). By H. L. White.

A Trip to the Fortesque River and Hamersky Ranges N. W. Australia. By F. L. Whitlock.

Birds of Lake Frome District. By J. Neil McGilp.

The Small Birds of the Granite Belt. By Spencer Roberts.—With some beautiful nest photographs.

Notes on the Tawny Frogmouth (*Podargus strigoides*). By Donald F. F. Thomson.—Interesting photographs of young.

Notes on Birds Observed at Sea. By Tom Carter.

Interesting Conduct of the Southern Stone-Plover (*Burhinus magnirostris*). By W. Macgillivray.

Private Collecting. By A. H. Chisholm.—This is a criticism of Mr. Ashby's paper (Emu Vol. 22, p. 210) and at once plunges Australia into the controversy that has long waged in America for and against private collecting.

The South Australian Ornithologist. VII, Part 2, April, 1923.

S. W. Australian Birds. By F. E. Parsons.

Cuckoo Eggs. By J. Neil McGilp.—Argues that the Fan-tailed Cuckoo (*Cacomantis*) deposits its egg in the nest of *Sericornis* with its bill.

A Trip to Southeastern Australia. By J. Sutton.

El Hornero. III, No. 1. February, 1923. [In Spanish.]

The Petrels and Albatrosses of the South Atlantic. By R. Dabbene.

Descriptions of two New Birds from N. W. Argentina. By Charles Chubb.—*Pseudosicalis stewarti* (p. 34). Catamanca, and *Notiocorys bogotensis shiptoni*. (p. 34) Aconquija. With a colored plate.

Notes on the Birds of Santa Elena. By P. Serie and H. Smyth.

Notes on *Anthus antarcticus*. By R. C. Murphy.

Observations on Ornithological Pathology. By C. A. Morelli and F. A. Ubach.

Systematic Catalogue of the Birds of the Provence of La Rioja. By E. Giacomelli.

Biological Notes on Some Birds of Santa Fe. By A. S. Wilson.

Tori. III, No. 14, March, 1923. [In Japanese.]

Birds in the Vicinity of Shizuura, Suruga. By N. Kuroda.

On the Migration of Some Waders near Wakayagi, Pref. Miyagi. By S. Kumagai.

Notes on Birds from Oshima, Prov. Izu. By T. Momiyama.
History of Birds (1). By K. Wada.

Revue Francaise d' Ornithologie. No. 167, March 7, 1923. [In French.]
The Retina of Diurnal Birds of Prey. By P. Portier.
Some Birds Observed in the Alps. (Cont'). By H. Jouard.

Revue Francaise d' Ornithologie. No. 168. April 7, 1923. [In French.]
Observations on some Modifications of Plumage Produced by Captivity. By Bailly-Maitre.
The Larks of Northeast Africa. By A. Blanchet.

Revue Francaise d' Ornithologie. No. 169, May 7, 1923. [In French.]
The Birds of the Isle de Riou. By H. de Balsac.

L'Oiseau. IV, No. 2 and 3. February and March, 1923. [In French.]
As explained above many of the articles are identical with those in 'The Avicultural Magazine.'

Ornithologische Monatsberichte. 31, No. 2, March–April, 1923. [In German.]
A New *Phylloscopus* from Szetschwan. By E. Stresemann.—*P. pseudes* (p. 30).
East Palaearctic Migrants in Cameroon. By H. Grote.
Notes on Nomenclature of Indo-Australasian Birds. By E. Stresemann.
In a Review of Chapin's paper on *Steganura*, Grote describes *S. paradisaea togoensis* (p. 34) from Togo.

Ornithologische Monatsberichte. 31, No. 3, May–June, 1923. [In German.]
Is the Song of the Chaffinch Inherited or Acquired? By W. Hagen.
New Birds for Java. By M. Bartels.
In the 'Notes.' H. Grote describes *Crinifer africanus obscuratus* (p. 63) Cameroon.

Ardea. XI, Afl. 2–3. 1922. [In Dutch.]
The Moult of *Uria troille* and *Alca torda*. By Jan Verway. [In English.]

Yearbook of the Netherlands Ornithological Club. 13, Afl. I. 1923. [In Dutch.]
On Netherlands Birds Overseas. By Snouckaert.
Observations at Sea in the Indian Archipelago.
Mareca americana. A New Duck for the Netherlands Fauna. By C. Eykman.

Ornithologische Beobachter. XX, No. 5. February, 1923. [In German.]

Holidays in Texel. By J. Schinz—Account of the Bird Life—continued in Nos. 6 and 7.

Bird Migration in the Alps. By K. Bretscher.

Ornithologische Beobachter. XX, No. 6, March, 1923.

Bird Life as Reflected in the Poems of Dante. By H. Siegrist.—continued in No. 7.

Ornithological Articles in Other Journals.[1]

Evermann, Barton M. The Pelicans of Pyramid Lake. (Overland Monthly, May, 1923.)—An account of securing the material for the group in the California Academy.

Meinertzhagen, Annie C. The Subspecies of the Dunlin, (Scottish Naturalist, January–February, 1923.)—Confirms Schiöler in recognizing three races in Europe. *E. a. arctica* Schiöler is the breeding bird in east Greenland.

McMilliam, Rev. J. M. Notes on Some of the Birds of Buteshire and Ayrshire (Ibid., March-April, 1923).

Criddle, Norman. The American Magpie in Manitoba. (Canadian Field Naturalist, February, 1923.)

Lloyd, Hoyes. Observations on the Wintering Flocks of Canada Geese in Nova Scotia. (Ibid.)

Beaupre, Edwin. The Short-billed Marsh Wren. (Ibid., April, 1923.)

Kermode, F. Notes on the Occurrence of the Plumed Egret (*Mesophoyx intermedia*) in British Columbia. (Ibid.)—A specimen obtained at Burrard Inlet, May, 1879 by an Indian and long regarded as the Snowy Egret proves to be this species.

Thacker, Mr. and Mrs. T. L. Bird Notes made at Vaseaux Lake, South Okanagon, B. C. (Ibid.)

Munro, J. A. Winter Bird Life at Okanagan Landing, B. C. (Ibid.)

Munro, J. A. A Preliminary Report on the Relation of Various Ducks and Gulls to the Propagation of Salmon. (Ibid., May, 1923.)

Munro, J. A. The Pileated Woodpecker. (Ibid.)

Snyder, L. L. and Baillie, J. L. Notes on the Birds and Mammals of Brent and Vicinity, Ont. (Ibid.)

Hare, H. L. Random Notes from Nyasaland and Elsewhere. (South African Jour. of Nat. Hist., January, 1923.)

Carlisle, J. S. Rare South African Birds' Eggs. (Ibid.)

Godfrey, R. The Birds of Somerville. (Ibid.)—In the East Cape Region.

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[1] Some of these journals are received in exchange, others are examined in the library of the Academy of Natural Sciences of Philadelphia. The Editor is under obligations to Mr. J. A. G. Rehn for a list of ornithological articles contained in the accessions to the library from week to week.

Robinson, H. C. and C. Boden Kloss. (1) Birds from One Fathom Bank Light House, Straits of Malacca. (2) List of Birds Collected on Pulan Jarak, Straits of Malacca. (3) Three New Oriental Birds—*Otus luciae siamensis* Bandon Siam; *Cyornis anak* (p. 261) Trang Siam; *Kitticincla malabarica interpostia* (p. 262) Daban, S. Annam (Journal Federated Malay States Museum, X, part 4, December, 1922.)

Baker, E. C. Stuart. Game Birds of India, Burma and Ceylon. XXXIII (Journal Bombay Nat. Hist. Soc., XXVIII, No. 4, December, 1922.)—Genus *Ammoperdix*.

Baker, E. C. Stuart. Hand List of the Birds of India. VII. (Ibid.) —Columbidae to Laridae.

Ticehurst, C. B. The Birds of Mesopotamia. Part IV. (Ibid.)

Sewell, R. B. Seymour. A Survey Season in the Nicobar Islands. (Ibid.)—Numerous mentions of birds.

Whistler, H. A Contribution to the Ornithology of Cashnere. (Ibid.)

Gill, E. H. N. A Description of the Nests and Eggs of the Common Birds Occurring in the Plains of the United Provences. (Ibid.)

Trevenen, W. B. Shikar near and around Poona. (Ibid.)

Ticehurst, C. B. Notes on the Indian Wagtails. (Ibid.)

Ellison, B. C. H. R. H. Prince of Wales' Shooting in India. (Ibid.) —No less than 1242 Sand Grouse were killed by the party in one day and 808 the next while 27 Demoiselle Cranes were shot on another day. An illustration from a photograph shows the enormous number of Sand Grouse at Gujner, Bikaner.

Chance, Edgar. The Mystery of the Cuckoo (Pagent of Nature),—A brief summary of the author's investigations with photographs from the Cinema reels, showing the laying of the egg, etc.

Bryant, H. C. Birds of the Yosemite Valley (The Gull, Vol. 5, No. 3, March, 1923).

Bailey, A. M. The Haunts of the Emperor Goose. (Natural History, XXIII, No. 2, March and April, 1923.)—Beautiful illustrations of Alaskan scenery and the nest of the Goose.

Articles on Bird Study and Bird Protection.[1]

Bird Classes of the Audubon Society of the District of Columbia, II, 1913–1922.—An account of the meetings but no clue to author or place of publication.

Houses for North Dakota Birds. Univ. of North Dakota. Bulletin VII, No. 1. February 1923.—Contains numerous patterns for boxes and illustrated by sketches of a number of common birds.

Birds of the Garden. By Tracy I. Storer. Reprint from 'The Courier' Berkeley, Calif.

The Purpose of Bird Censusus and How to Take Them. By May T. Cooke. U. S. Dept. Agr. Circular 261. April, 1923.

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[1] Only a very few papers, reports or journals covering these subjects can be noticed in these columns, so numerous have they become.

CORRESPONDENCE.

The Heath Hen.

Editor of 'THE AUK:'

The Heath Hen (*Tympanuchus cupido*) has never been in greater danger of extermination than it is at the present time, and unless there is a change for the better the species will be destined to share the fate of the Passenger Pigeon, the Great Auk and the Labrador Duck within a very few years. The only living representatives of the species are now on Martha's Vineyard Island, Massachusetts where their last stand is among the scrub oaks and meadows located near the central portion of the island. Since the Commission on Fisheries and Game, now Division of Fisheries and Game, established the Heath Hen Reservation in 1908, the bird has been subject to great fluctuations in numbers. For a few years it thrived under the protection and care provided by the reservation and by the Spring of 1916 the numbers, according to a census made by Mr. E. H. Forbush, had increased from 55 to 800, and Mr. William Day then Superintendent of the reservation, estimated not less than 2,000 birds. In May of the same year a destructive fire swept over the island which not only killed many nesting females, but also destroyed much of their cover and food supply. The subsequent appearance of many Hawks further aided in reducing the numbers so that in the following year less than 150 birds remained. For the three following years the Heath Hen seemed to rally from this catastrophe by a steady increase which reached a maximum of 600 birds in 1920, according to an estimate made by Mr. Allan Keniston, the present Supt. of the reservation. The following year the number of birds seen was 314, in 1922 only 117 were counted and this year, 1923, the usual census reveals a count of less than 50 birds. Never since 1908 when the reservation was established has the Heath Hen been reduced to such small numbers. The Division of Fisheries and Game has done all in its power to maintain and to increase this unique bird, but their best efforts have failed. The response to a questionaire sent out by Mr. William C. Adams, Director of the Division has shown conclusively that public opinion favors saving the Heath Hen at all reasonable costs.

The members of the Nuttall Club at Cambridge and the Brookline Bird Club of Brookline in answer to the questionaire made recommendations to the Director that a life history study be undertaken and also that an investigation be made of the conditions which govern the existance of the bird on the island, in order that some definite proposal could be offered which might be an aid in saving this bird. Dr. John C. Phillips has taken the initiative in causing this study to be made and he with the assistance of J. E. Thayer, C. H. Mackay, T. Barbour, W. P. Wharton, C. F. Batchelder, A. Hemenway, W. M. Tyler, and F. A. Foster, have provided the means necessary for its execution.

The present status of the Heath Hen as revealed by the census taken during April (1923) and repeated in May indicates clearly that some action must be taken at once without waiting for the present study to be completed or else the opportunity may be gone for ever. The extraordinary decrease in numbers since 1920 can be explained only in part by unfavorable weather during the breeding season, poaching and other minor causes. From a biological point of view it seems that the great factor in this rapid decline is due to the excess males, an abnormal relation in numbers of the sexes, caused primarily by the fire of 1916. This condition did not manifest its effect immediately as might be expected, but if our analysis of the situation is correct, is now causing the destruction of the species. It is well known that rodents such as rabbits and rats may be exterminated by capturing the animals and freeing all males, a condition comparable to that now existing in our only colony of the Heath Hen. Furthermore gamekeepers in Europe especially in England and Scotland regularly kill the excess male birds in order to insure the vigor of the stock and the increase in numbers of individuals. The same method is now employed by certain persons in America who are attempting to propagate Ruffed Grouse and other gallinaceous birds on a large scale.

The Heath Hen, judging from studies of allied species, is probably polygamous and may practice polyandry (we hope the investigation may definitely establish the truth of this supposition). Among birds in which these conditions maintain the females are harassed during the entire breeding period with the result that irreparable damage is done to the eggs and young. The study of the Heath Hens thus far made, clearly indicate that the excess number of males is extreme. Consequently it seems advisable to trap as many of the males as possible, band them and keep them confined in large individual pens until the end of the breeding season. This plan if successful should be repeated each year until the readjustment has been accomplished.

This procedure may not be the means of saving the Heath Hen, but it is our last straw, and those in charge of the investigation feel that it may be a most important factor in helping the race to recuperate.

Yours truly,

ALFRED O. GROSS,

Bowdoin College,
Brunswick, Maine.

"Blue Feathers"

Editor of 'THE AUK:'

An article on "Blue Feathers" appears in the April number of 'The Auk' which purports to be a contribution to knowledge and presumably is to be judged by the standards which investigators are supposed to maintain in their publications. Furthermore, this paper is stated to represent work done on a grant for research from the "Heckscher Foundation for the Advancement of Research, Established by August Heckscher at Cornell University" (p. 275).

There is an appearance of recognition of literature, yet papers which cover a considerable portion of the material that the reader is apparently expected to consider original, are entirely ignored. The elaborate work of Kniesche[2] and of Spöttel is not mentioned nor are there any references to papers by myself which cover points made in the article. There is nothing new to science in the "conclusions," though this is where the more important original contributions of a paper are expected to be mentioned. On page 278, the following statement occurs. "It is generally recognized that white in feathers is a question of structure; but there seems to be no definite statement as to the exact mechanism and consequently a more detailed study has been made." No reference is made to two publications of mine [4, 5] on this subject, nor is there any recognition of my statements [4] and figures concerning the blue producing structures of the Blue Jay and Bluebird on pages 280 and 284 where their structure is discussed.

Considerable attention is given to explaining the color of green feathers on pages 296 and 297 with no recognition of the more adequate treatment of the subject by Kniesche. The paper is a curious mixture of a partial recognition of work by other writers with numerous statements for which credit is not given and a small amount of new material.

There is a contribution from the experimental side in support of the theory first advanced by Haecker in explanation of the color of blue feathers. The production of turbid medium blue by a collodion jelly is interesting, though colloidal preparations giving turbid medium blue effects are not new. The polarization observations are, so far as I know, new, likewise the effects of pressure on the color of blue barbs. A list of papers dealing with the subject follows:

1. Bancroft, W. D., Chamot, E. M., Merritt, E., and Mason, C. W. Blue Feathers. The Auk, 1923, Vol. XL, No. 2. p. 275 to 300.
2. Kniesche, G. Über die Farben der Vogelfedern. I. Die Grünfarbung auf Grundlage der Blaustruktur. Zool. Jahrbuch. Abt. Anat. und Ontog. 1914, Bd. 38, S. 325–356. Mit Tafel 18–21 und 5 Abbildungen im Text.
3. Spöttel, W. Über die Farben der Vogelfedern. II. Die Färbung der Columba livia nebst Beobachtungen über die mechanischen Bauverhältnisse der Vogelfedern. Zool. Jahrbuch. Abt. Anat. und Ontoge 1914, Bd. 38, S. 357–426. Mit Tafel 22 und 70 Abbildungen im Text.
4. Strong, R. M. White Feathers. Biol. Bull. 1904, Vol. VI, No. 6. p. 311.
5. Strong, R. M. The Causes of Whiteness in Hair and Feathers. Science, N.S. 1921, Vol. LIV, No. 1398. Oct. 14. p. 356.
6. Strong, R. M. The Development of Color in the Definitive Feather. Bull. M.C. Zool. Harvard, 1902, Vol. XL, No. 3. pp. 147–185. 9 Plates. See p. 162 and Figs. 7 and 8, Pl. I.

Sincerely Yours,

R. M. Strong.

Chicago, Ill.
May 7, 1923.

Protecting Nesting Sites

Editor of 'THE AUK:'

The attached copy of a resolution of the Council of the Ottawa Field Naturalists' Club is forwarded for your information. It is the feeling of the Council that rare birds may occasionally be seriously endangered by the publication of some items concerning them. Your cooperation in forwarding the aims expressed in this resolution is solicited by the Club.

Yours very truly,

HOYES LLOYD.
President.

Whereas—many of our finest and most interesting birds that formerly bred in what are now settled localities are so seriously reduced in number as to be in danger of extermination and,

Whereas—we are occasionally discovering stations still occupied by these birds in territories that are easily accessible to those who have not the welfare of these birds at heart. Therefore

Be it resolved—that the Ottawa Field Naturalists' Club places itself on record as believing,—

That whilst it is important that all such information should be brought to the attention of science it is inexpedient to publish the same where it may become common property. They therefore

Recommend that such information be filed only in the records of duly accredited and continuing institutions that have a serious interest in the study and preservation of wild life and where it may be available for qualified research students of approved discretion, for future generations or until the wider dissemination of the information can do no harm to the species concerned.

Further, that all who discover such information are urged to transmit it to such institutions as are particularly interested and equipped for recording such confidential information and to no one else on whose discretion they cannot rely.

Further that such institutions record the information so received in such a manner that its confidential nature will not be violated, that it may be available at any time to those who have a legitimate interest in it, and that it may not be lost or forgotten through lack of present publication.

However, be it understood that nothing in these resolutions be deemed to prevent the information being given privately and under the seal of confidence to such students who have a legitimate interest in it and will not use it improperly or cause or permit others to do so.

Up to Date Names

Editor of 'THE AUK:'

In Book News and Reviews of 'Bird Lore,' March, J. T. N. writes "The editorial policy of following latest supplements to the A. O. U. Check-List as regards generic names in faunal papers, quite noticeable in this number

of 'The Auk,' seems to the reviewer a questionable one. The names in the latest published edition of the Check-List (followed by standard bird books) will always be more familiar to ornithologists who do not happen to be particularly concerned with the vagaries of nomenclature." Those ornithologists who do not happen to be particularly concerned with the vagaries of nomenclature should confine themselves to the 'Check-List,' and go by the common names in 'The Auk.' After the supplement has been published in 'The Auk' every faunal paper that has enough character to be called scientific should follow it. In fact wherever in 'The Auk' there is occassion to use a scientific name it should be followed. After a name has been accepted as correct it can not be called a vagary, unless the whole system of nomenclature founded on priority is a vagary. After a bird's name has been accurately determined and accepted it cannot in truth have any other.

I think A. C. Bent is right in using the latest scientific names in his works if he is sure they are right, but there should be some way to identify them.

HOWARD WHITNEY,

45 East Street,
Hartford, Connecticut.

[Our correspondent apparently does not realize that there are two classes of nomenclatural changes, one based on priority and similar definite rules; the other (creation of new genera by splitting up old ones) based on personal opinion. In the latter, one name is as "right" as another, and for that reason more than ever the innovation should be avoided in faunal or general papers until it is endorsed by the A. O. U. Committee.—W. S.]

NOTES AND NEWS.

THE Stated Meeting of the Union this year will be held in Cambridge, Mass., during the week of October 8th. The time has been chosen by the Local Committee in deference to a generally expressed desire for an early date for the Meeting. Records show that in eastern Massachusetts this part of October has the best prospect of fine weather in the whole autumn, and it is hoped that visiting members will be able to make some interesting excursions into the country.

Members planning to present papers to be illustrated by cinema, are requested to notify Dr. Glover M. Allen, Museum of Comparative Zoology, Cambridge, not later than September 1st.

REV. JAMES HIBBERT LANGILLE, an Associate of the Union, died at Forest Glen, Maryland, on April 9, 1923, having been struck by a train while crossing the tracks of the Baltimore and Ohio Railroad. Mr. Langille

was in his 82nd year. He was born at Mahone Bay, Nova Scotia, September 12, 1841 and received his education at Horton Academy and Acadia College, in the Grand Pré region of Nova Scotia; at Oberlin College, where he was graduated in 1867; and at Rochester Theological Seminary, where he was trained for the ministry. He began preaching at the age of sixteen and continued to preach during his collegiate courses; in 1873 he became pastor of a Baptist church at Knowlesville, N. Y., where he remained for eight years; following this he was pastor of a church in Buffalo for three years. In 1885 he gave up his ministerial work and moved to Maryland, where he purchased a tract of land—largely woodland—near Kensington, about ten miles from Washington. Since that date he has lived continuously on his farm, which he cleared and developed almost entirely by his own labor.

Langille is best known as the author of 'Our Birds in their Haunts: a popular treatise on the birds of Eastern North America,' which appeared in 1884[1] and was republished in 1892.[2] Articles from the book had previously been published in the 'Nuttall Bulletin'[3] and' The Auk,'[4] and the volume was favorably received, evidently filling a distinct need. The present writer feels that he owes a special debt of gratitude to the author, since this book was the first bird book that came into his possession as a boy and was largely the means of stimulating a budding interest in natural history. As noted by the reviewer in 'The Auk,'[5] Langille had a keen ear for bird music and was unusually successful in his descriptions of bird songs. These descriptions, as well as some of his charming biographies have frequently been quoted by later writers.

He was the author also, of 'Popular History of the Life of Columbus,' (in collaboration with Mary F. Foster) and of eight children's books for Sunday School use. He left a manuscript on 'The Life and Voyages of Americus Vespuccius and the Naming of the Continent.' He is survived by his wife, two sons and two daughters.—Arthur H. Howell.

Howard Eaton, a Life Associate of the Union since 1918 died at Sheridan, Wyoming, April 5, 1922. The immediate cause of his death was peritonitis following an operation for appendicitis. He was in his 72nd year having been born in Pittsburgh, Pa., Feb. 8, 1851, and was one of a family of nine children. At the age of 17 he started west and spent a year at Omaha, Nebr., and then returned home. Ten years later, in 1879, he again went west and located in the bad lands of the Little Missouri near Medora, N. Dak., a spot later made famous by Theodore Roosevelt in his 'Hunting Trips of a Ranchman.' Here Eaton became a post-trader

[1] S. E. Cassino & Co., Boston.
[2] Orange Judd Co., New York.
[3] Bull. Nutt. Orn. Club, vol. 7, pp. 119–120, 1882.
[4] Vol. 1, pp. 268–270, 1884.
[5] Merriam, C. Hart, Auk, vol. 2, pp. 91–94, 1885.

and was joined by two of his brothers and the three engaged in the cattle business. In 1904 the Eaton brothers moved west to Wolf, Wyoming, near Sheridan, where they engaged in ranching and Howard conducted parties through the Yellowstone and other National Parks and to Jackson Hole. The Eaton Ranch became famous as a tourist resort and few men in the west were personally known to a larger circle of acquaintances than Howard Eaton.

Always affable and good natured, he saw the bright side of every situation and had an inexhaustible fund of anecdotes. Deeply interested in the wild life of the West he took an active part in every movement for its conservation and especially in measures for the preservation of the buffalo and elk. While not strictly an ornithologist he knew the more conspicuous birds of the Rocky Mountain region was familiar with their habits and did much to interest others in them and in bird protection. In the death of Howard Eaton the West has lost a unique and ardent advocate of conservation and the Union an enthusiastic Associate and practical field observer.—T. S. P.

Dr. William W. Arnold, an Associate of the American Ornithologists' Union, died at Colorado Springs, Colorado, March 30, 1923, in his eightieth year. Dr. Arnold was born in Connersville, Indiana, August 28, 1843, the son of a physician, John Arnold. He came to Colorado Springs in October, 1886, and resided there continuously from that time until his death. He was married July 14, 1863, to Mary Evaline Shaw, who survives him.

Dr. Arnold was always interested in Nature, and during the last years of his life gave much of his time to the cause of bird protection, and did so in a most practical manner. He gave many talks about birds to the school children of Colorado Springs and vicinity, often illustrating them by means of mounted specimens, and sometimes even with living birds from his well known "Bird Hospital." Always fond of and understanding children he was able to interest them in his pleas for the preservation of our birds, and I suppose it was really as a result of these talks that the Bird Hospital had its beginning.

A child who had heard him at one of the schools brought an injured bird to him and asked him to cure it. The patient was taken in and cared for, and from this beginning the institution grew until there was a good-sized aviary and a number of smaller cages, and the hospital was never without patients. Some were permanent inmates, crippled in some way so that they could not be freed. In most cases, however, as soon as a bird had recovered it was set free. Once after an unusually violent hailstorm in summer I went to see him, and found him caring for over a hundred Robins which had been brought in, besides numerous birds of other species. Many were sorry, miserable looking objects. The hail had beaten them so that some had the feathers stripped from their heads, others had broken wings, many were blinded in one or both eyes. The kindly doctor worked

faithfully with them all. Some were so badly injured that they died but the great majority recovered and were given their liberty. Doubtless without this care many of these also would have perished.

The hospital had many visitors, especially among the summer tourists, and thus became known over the whole country. Dr. Arnold also wrote accounts of it for certain magazines.

In person Dr. Arnold was of rather slight build, always genial in manner, with words of hearty welcome for his friends. While always interested in anything pertaining to birds, or in fact to any other branch of natural history, I think he cared little for the purely scientific side of ornithology, though his knowledge of our local birds was excellent.

An interesting episode in his life was his adoption by the Chippewas of the Crow Wing Reservation in Minnesota in 1869, when he cured an Indian girl of pneumonia, after the medicine man, her grandfather, had failed. He owned a bear claw necklace and a long-stemmed pipe given him by the Chippewas.

He became an Associate Member of the American Ornithologists' Union in 1910, of the Cooper Ornithological Club in 1911, and was also a member of the Colorado Audobun Society, as well as of several Medical Societies.—Edward R. Warren.

A tablet commemorative of Alexander Wilson and his work was unveiled at the Academy of Natural Sciences of Philadelphia on the evening of May 17, 1923. It was presented to the Academy by the St. Andrew's Society of Philadelphia, through the generosity of the late Dr. J. Lawson Cameron a native of Paisley, Scotland, where Wilson was born.

The tablet was designed by Dr. R. Tait McKenzie and consists of a medallion of the head of the ornithologist with appropriate inscription. Members of the St. Andrew's Society, the Academy, the Delaware Valley Ornithological Club and the President and Secretary of the American Ornithologists' Union were present at the unveiling. Dr. McKenzie, B. Gordon Bromley and Dr. John Welsh Croskey were the Committee in charge and Mr. Samuel Scoville, Jr., delivered the address.

Lord Rothschild as president of the British Ornithologists' Union has addressed a letter, under date of May 25, to the Minister of the Interior of Poland protesting against the bounties offered by the Board of Fisheries in Torun, Poland, for the heads of Kingfishers, Ospreys, White Storks, Black Storks, Gulls, Common Divers (Crested Grebes), Great Divers (Loons), Bitterns, and Herons. The letter calls special attention to "the Black Stork, the Bittern and the Great Divers which are so rare and scattered that it does not seem possible that they can be a real menace to fish and fishing.

"The Black Stork has already become so rare over the greater portion of Europe that it is only by special protection their extermination has been

prevented and there are probably not more than four or five pairs now existing in your Country.

"The British Ornithological Society feel sure that your Government have no desire to imperil the existence of any bird, much less that of birds such as the Black Stork and the Bittern and they sincerely hope that your Excellency and the Board of Fisheries will consent to reconsider their decision and modify it in respect to the rarer species of birds included therein."

DR. LEONARD STEINEGER, a Retired Fellow of the Union, was elected a member of the National Academy of Sciences at the meeting in Washington on April 25 and shortly after was awarded the Walker grand prize of $1000 by the Boston Society of Natural History. This prize was awarded in 1903 to the late Dr. J. A. Allen and a few years afterwards to Mr. Robert Ridgway.

BENGT BERG, of Stockholm, Sweden, a noted writer, traveler and bird photographer, recently spent a few weeks in the United States visiting New York, Washington, Indianapolis, Chicago, Los Angeles, San Francisco and other cities en route to the Pacific coast and back. On March 22 he lectured at the American Museum in New York and on March 27 at the U. S. National Museum in Washington on his recent trip to the Nile. The lecture was entitled 'As a Bird of Passage in Africa' and was illustrated by an unusually fine series of motion pictures of Ducks, Geese, Cranes, Storks, Ibises, and other birds. Mr. Berg specializes in photographing large birds or those which are difficult to approach and one of the objects of his visit was to look over the ground for bird photography in this country. He sailed for home in May to make preparations for another trip to the Nile next winter.

Bengt Magnus Kristoffer Berg was born in Kalmar, Sweden, Jan. 9, 1885, and is the author of several popular novels and also several illustrated books on birds. A brief account of his work, with illustrations, appeared in 'Our World' for May, 1923, pp. 70–76.